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Marketing Research Report No. 825

A STUDY OF FOOD DISTRIBUTION FACILITIES FOR CINCINNATI, OHIO

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PREFACE AND ACKNOWLEDGMENTS

This study describes the operations of selected food firms and presents plans for the nucleus of a food distribution center to serve the Greater Cincinnati area.

Appreciation is extended to the wholesale food and food-related firms who cooperated in providing data. Five railroad companies, the Cincinnati Gas and Electric Company, the developers and real estate firms who provided information on sites, and members of Greater Cincinnati Chamber of Commerce—all contributed materially to the study.

Special recognition is due Earl R. Nelson, Manager of Joseph T. Ryerson & Son, Inc., who headed first the food industry task force for the Greater Cincinnati Chamber of Commerce and later the Chamber's steering committee; also, Kenneth Burch, Director of Economic Development; F.

Richard Dassell, Assistant Director of Economic Development; Charles Kramer, Director of Economic Research; and others of the staff of the Greater Cincinnati Chamber of Commerce. The preliminary work and able assistance of S. J. Tombaugh, former Assistant Director of Economic Development, made possible the rapid completion of this study. John H. Voelker of the John H. Voelker Company also gave valued assistance. A steering committee composed of representatives of the local government, the food trade, financial institutions, and other interested groups assisted in project coordination and disseminated information.

This study was conducted under the general supervision of Kenneth H. Brasfield, chief, Marketing Facilities Development Branch, Transportation and Facilities Research Division.

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A STUDY OF FOOD DISTRIBUTION FACILITIES FOR CINCINNATI, OHIO

By EARL G. TAYLOR, *agricultural marketing specialist*, and FRANKLIN J. MILLER, JR., *industrial engineer, Transportation and Facilities Research Division, Agricultural Research Service*

SUMMARY

At the request of the greater Cincinnati Chamber of Commerce, a study of selected food distribution facilities was undertaken in February 1967. The study was limited to those firms with urgent relocation problems. This report provides guides for the relocation of these firms and their formation into the nucleus of a food distribution center to serve the Greater Cincinnati area.

In 1966, the 12 food and food-oriented firms included in the study received over 200,000 tons of food products. Supplies were obtained from all parts of the United States, about 72 percent arriving by truck. Approximately 84 percent of the supplies was distributed within the study area, made up of the city of Cincinnati, Hamilton County, and the seven Ohio, Kentucky, and Indiana counties contiguous to Cincinnati.

The facilities proposed for initial construction are designed to fit in with the future development of a complete food distribution center. Buildings consist of one multiple-occupancy structure containing 13 units, having 39,000 square feet of first-floor space, and eight single-occupancy buildings with a total of 815,000 square feet of first-floor space. With necessary expansion area and land for allied industries, the project will require a 215-acre site. Estimated total construction cost of the recommended facilities is about \$13.4 million.

Three of the sites studied are considered adequate: Sites 1 and 2, both in Butler County, and site 3, in Hamilton and Clermont Counties. Cost of the land needed for the recommended facilities is estimated at \$800,000 to \$1.5 million, according to which site is selected.

With private financing, the total annual revenue needed to make the project fully self-supporting is estimated to be about \$1.6 million. Annual rental or ownership cost in the multiple-occupancy building would be about \$2.41 per square foot; single-occupancy buildings would require \$1.54 to \$4.51 per square foot, depending on the type of facility. For most firms, these rates would represent an increase in rent. Such higher costs could be partially offset, however, through more efficient operations resulting from better product flow, improved layout design, proper platforms, and generally improved working conditions. In addition to these direct improvements, firms relocating, producers, consumers, and communities could expect to benefit in many ways from the new facilities. Reduced damage, improved quality of food, simplified rail and truck operations, and closer compliance with health and sanitary regulations are some of the nonmeasurable benefits that can reasonably be expected to flow from the project.

BACKGROUND OF THE STUDY

Rapid technological improvements in the production, transportation, and distribution of food products have made changes in marketing necessary. These improvements have rendered many food distribution facilities in major urban areas unsatisfactory or obsolete. Many firms have attempted to improve their operating situation but have been restricted by the limitations of their facilities. These inadequacies affect not only the buyers and sellers in the market but also the producers, shippers, and consumers. Cincinnati, like many other cities throughout the Nation, is being affected by the changing food marketing situation.

A study conducted by the Greater Cincinnati Chamber of Commerce Economic Research Department, with assistance from the University of Cincinnati, determined that there has been a decline in the number of employees and volume of sales in the Cincinnati food industry. As a result of that study, the Chamber created a food industry task force to investigate the problems further. A survey questionnaire was mailed by the task force to 155 of the 260 wholesale food and food related firms in the Cincinnati metropolitan area. Those firms that were not considered to be prospective candidates for relocation were eliminated. The task

force reported its findings to the Greater Cincinnati Chamber of Commerce. The Chamber decided to request assistance from the U.S. Department of Agriculture.

The Chamber requested that the U.S. Department of Agriculture study be limited to those firms with urgent relocation problems in order to make the findings available in the shortest period of time. Work was begun in the winter of 1966-67.

The study has the following objectives:

To analyze the present situation of these firms and to determine if there is sufficient volume and variety to provide the nucleus of a new food distribution center.

To determine the kinds and amounts of facilities needed and acreage required for these firms, the cost of construction, and estimated cost of ownership of the proposed land and facilities.

To analyze possible sites that could accommodate the nucleus firms and future growth.

To provide a master plan for orderly future growth from the initial facilities to a complete food distribution center.

The area included in the study contains about 1.5 million people. It consists of the city of Cincinnati; Hamilton, Butler, Warren, and Clermont Counties in Ohio; Dearborn County in Indiana; and Boone, Kenton, and Campbell Counties in Kentucky. Figure 1 shows the boundaries of the study area.

Scope of the Study

A total of 30 wholesale food firms were surveyed during the study. Survey findings determined that 12 of these firms would benefit from immediate relocation in modern facilities. Preliminary analysis of these 12 firms indicates that the volume and variety of food products they handle make them suitable candidates for forming the nucleus of an eventual food distribution center.

The dot map in figure 2 shows the location of the 12 firms covered in the study. In contrast to the pattern in most urban areas, they are not concentrated in one or more market centers, but are scattered throughout the city. They include three public storage warehouses oriented toward the food industry, three wholesale grocery firms, two fresh fruit and vegetable firms, a frozen food firm, a specialized food-packaging firm, a coffee roaster, and a food-chain operation in two separate locations.

Highways and Transport Services

Cincinnati is referred to as "the gateway to the South," because of its location on the Ohio River. (See fig. 3.) Many of the major highways serving

the area originate in or near large southern producing areas. The city itself is the geographic and economic center of a tristate area consisting of parts of Ohio, Kentucky, and Indiana. A network of interstate highways serves the Cincinnati area, and connects it to the rest of Ohio and other States. Major highways are U.S. 22, 25, 27, 42, 50, 52, and 127; Interstate 71, 74, 75, and 275; and many State routes.

Six major railroads serve the city: Baltimore and Ohio Railroad, Chesapeake and Ohio Railway, the Louisville and Nashville Railroad, the Norfolk and Western Railway, the Penn Central Railroad, and the Southern Railway. All of these railroads provide service to the local food industry, either in delivering food direct to the warehouse or delivering it to team tracks. Piggyback trailer and van container services are also offered.

Water transportation is available by barge on the Ohio River, but it is of historical significance only as far as use by the food industry is concerned. Occasionally, premium food product items are received by air freight at the Greater Cincinnati Airport in nearby Boone County, Kentucky.

Volume Handled—Distribution Pattern

Food commodities handled by the 12 nucleus firms originate in many States and several foreign countries. Major sources of supply are Ohio, Kentucky, Indiana, California, Florida, Illinois, Michigan, Wisconsin, Iowa, Arizona, Idaho, Missouri, Massachusetts, Maryland, Pennsylvania, and New York. In 1966, a total of 209,343 tons of food products was received. Of this volume, about 72 percent arrived by truck, 22 percent by rail to house tracks, 4 percent by piggyback trailer, and 2 percent by rail at team track locations. Tonnages of these receipts by type of transport were as follows:

<i>Type of Transport</i>	<i>Tons</i>
Truck	150, 220
Rail to house tracks.....	46, 718
Piggyback trailer.....	9, 151
Rail to team track.....	3, 254
Total	209, 343

In addition to the direct receipts, a substantial tonnage of food products are transferred between dealers. Such transfers result from occasional inventory shortages, need for items not carried ordinarily in inventory, or normal movement of food



FIGURE 1.—The Cincinnati food distribution study area.

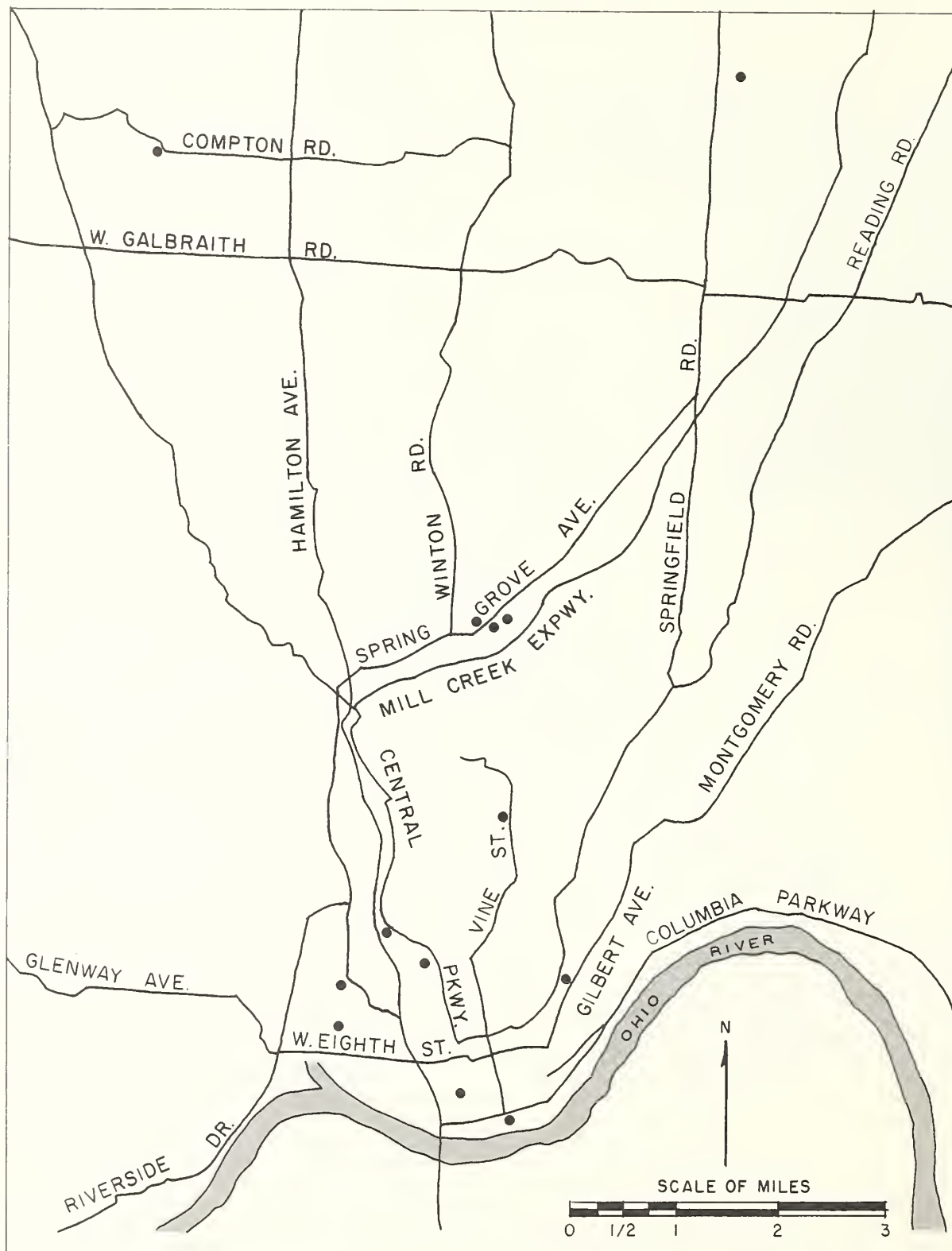


FIGURE 2.—Location of firms for which new facilities are recommended.



FIGURE 3.—An industrial and commercial section of Cincinnati, along the Ohio River.

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commodities between firms. In 1966, about 17,528 tons of interdealer transfers were effected among these firms. Total volume handled that year, therefore, was 226,871 tons made up of—

Direct receipts	209,343 tons
Interdealer transfers	17,528 tons

Figure 4 shows volumes received in 1966 by the nucleus firms by type of transport and the pattern of geographic distribution of their sales in the Cincinnati area. Out of total direct receipts, about 84 percent was distributed within the study area. Nearly three-fourths of this was sold in the city of Cincinnati and surrounding Hamilton County. The remaining volume was distributed about evenly among the seven other counties making up the study area. Over half of the 16 percent of food products that were moved outside of the study area was distributed in other Ohio areas.

Space Use—Employment—Tenancy

The 12 firms occupied a total of approximately 627,000 square feet of floor space, of which 420,000 square feet—about 67 percent—was first-floor space. Special-use storage consisted of 17,108 square feet of cooler space and 5,918 square feet of freezer space. This special-use storage does not include other temperature-controlled areas, such as processing or ripening rooms. Other uses for floor space included offices, which comprised approximately 22,280 square feet of floor space.

These firms employ over 200 people, excluding management, clerical, and sales personnel.

Of the firms covered in the study, eight rented and four owned their facilities. Most are in single-story structures, but a few are in multistory warehouse buildings.

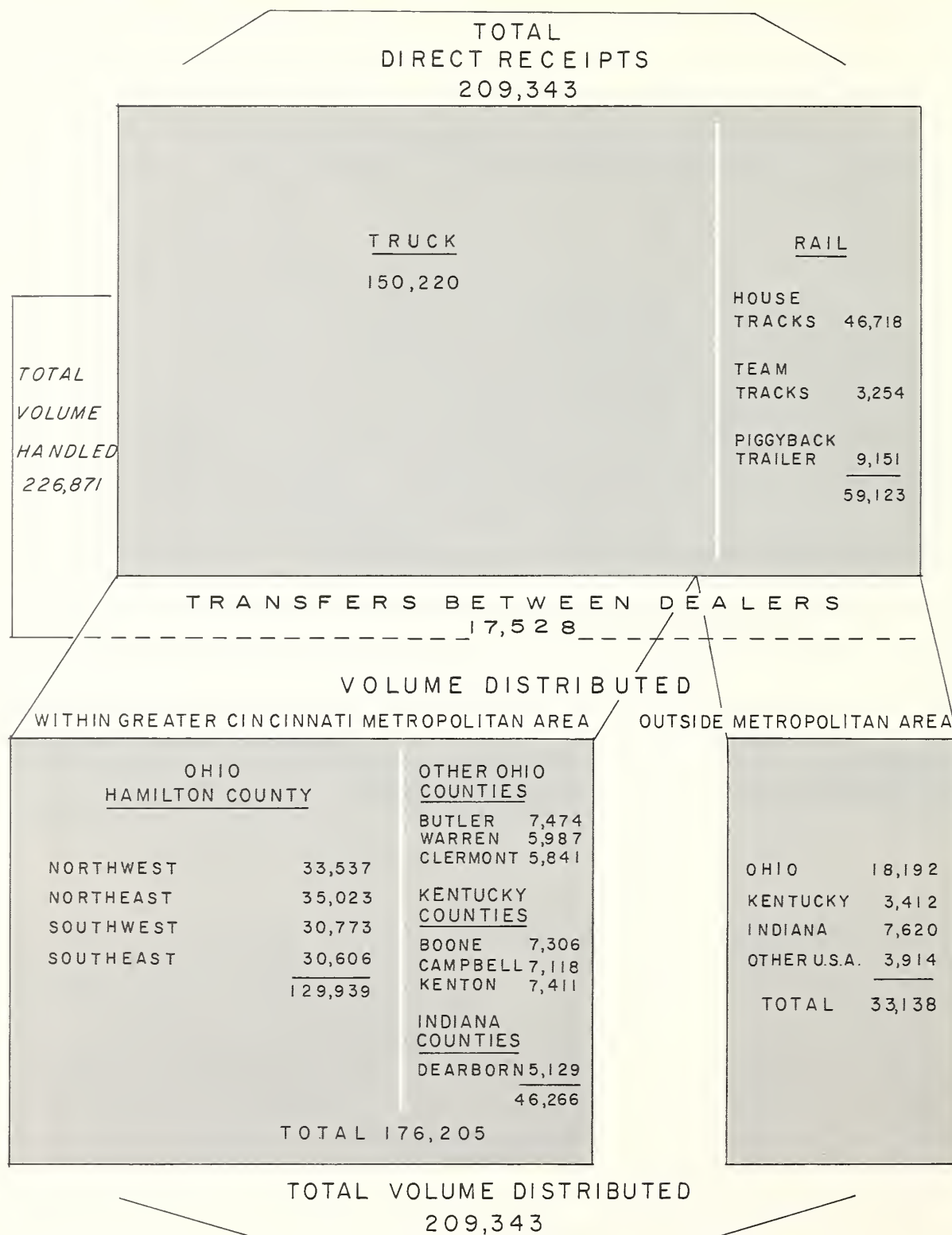


FIGURE 4.—Tonnes of food received in Cincinnati area in 1966 by type of transport; sales by distribution area.

INADEQUACIES OF THE NUCLEUS FIRMS

Principal deficiencies among existing marketing facilities and methods are (1) insufficient land available for expansion; (2) buildings not suitable for food handling; (3) inadequate access to transportation facilities, both rail and highway; and (4) excessive operating expenses.

Insufficient Land

Many of the facilities have a common handicap—the lack of expansion area. In order to remain in business in the highly competitive food industry, volume must be increased and costs of operation must be reduced. To handle an increased volume, operating space must be available. Many of the firms included in this study have expanded their facilities and operations as far as is physically possible (fig. 5).

The position of these firms is further complicated by the lack of adequate parking facilities. Competition from other business firms or residences for available space results in unsatisfactory parking conditions for all. Often potential buyers are discouraged and business is lost as a direct consequence of insufficient parking.

Unsuitable Buildings

A few of the facilities occupied by the food firms studied are inefficient multistory structures. The interiors have other disadvantages, such as too many obstructions; floors that are uneven, difficult to maintain, and incapable of supporting mechanical material-handling equipment; low ceilings that preclude the use of pallet racks; and poor lighting, both in intensity and location. Improper size and type of doors add to the mechanical handling problems. In general, operating methods must be restricted to the limitations of the warehouse facilities; the result is built-in inefficiency.

In the multistory facilities, unnecessary handling and wasted space occur, particularly above the first floor. When areas above the first floor are used, they must be reached by stairs, conveyors, or slow elevators. Some facilities do not have floors at truck-bed height, necessitating extra handling during truck loading and unloading operations. Entrance to several buildings is possible only from the front, since trucks cannot get to rear doors because of narrow alleys and streets. Other buildings have no rear doors, which complicates interior layout. The long, narrow shapes of one or two structures cause trips to storage areas to be longer than should be necessary.

Most of the old buildings are in need of repair. Leaking roofs cause spoilage and deterioration of the products. Insurance rates are high because of

the antiquated condition of these facilities. Health and sanitary regulations are difficult to enforce because of the generally obsolete conditions. Inadequate refrigerated storage and lack of humidity control are problems in dealing with perishable commodities.

Inadequate Access to Transportation

Streets and truck-maneuvering areas for access to the buildings are generally too small for the types of vehicles used by the food industry. In many instances, the streets must be used as maneuvering areas for trucks. This practice causes delays in positioning trucks for loading and unloading and also interferes with other traffic.

Access to commercial routes and interstate highways is poor from many of the facilities. Lack of direct rail service requires several firms to receive at team track areas and to cart products by truck to their stores. Some dealers who have direct but low-capacity rail service must also cart products from team tracks some distance from their facilities. Besides the direct expense involved, such rehandling contributes to unnecessary spoilage and damage to many commodities.

Excessive Operating Costs

Among the firms studied, some branches of the food industry are represented by only one dealer; therefore, operating expense cannot be shown by commodity handled without revealing confidential data. The selected costs listed below, therefore, are summary totals for the 12 firms studied. These costs were provided by the firms studied. Similarly, since it was not practicable to separate the costs of handling nonfood items from costs of handling food products in the dry grocery operations, these expenses are also included in the totals.

	<i>Dollars per year</i>
Cartage—from team tracks and between houses-----	26,032
Handling—into, within, and out of the warehouse-----	1,378,219
Warehouse charge—on temporary storage-----	9,200
Warehouse damage—avoidable losses-----	15,750
Rent or rent equivalent-----	255,886
Total-----	1,685,087

Scattered locations make transfers of products between operators expensive and time consuming. Interchange of commodities between firms is necessary for specialty items and fill-in products. A common location for all dealers would make possible substantial cost reductions in interdealer transfers.



FIGURE 5.—Both these food distribution facilities in Cincinnati lack land for expansion, and one also lacks docking and loading facilities.

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HOW TO REMEDY THE DEFECTS

A food distribution center for distributors of all food commodities and for service facilities related to food distribution could serve as the basis for solving many of the problems discussed. The common needs of wholesale food firms for low-cost facilities, for direct rail service, and for good access to highways, as well as their common dependency upon one another, are best served in a consolidated market. Certain economies can be made in land requirements, building construction costs, and operating expenses when facilities are provided at one location. Also with enough firms in an area, common services can be provided, such as banks, service stations, garages, and offices.

The primary purpose of a food market is to serve as a common meeting place for buyers and sellers. Widely scattered locations of food firms render this function a distinct problem and result in unnecessary costs. The more complete information buyers and sellers have regarding supply and demand, the more competitive will be the price established, and the more readily will food commodities be moved into market channels. The larger the volume and variety of business done in one location, the more attractive the market is to buyers and possible new food and food-oriented businesses.

The design and operation of a food distribution center for Cincinnati should meet the needs of the present and provide flexibility to satisfy the needs of the future. Future orderly growth from a nucleus to a complete food distribution center will be described later in this report.

Planning a Food Distribution Center

The most important objectives that must be considered in planning a food distribution center are completeness, adequate facilities, orderly arrangement, proper location, reasonable land cost, and sound financing and management. By failing to consider any of these objectives, serious operating problems could detract from the efficiency of the new center.

A complete food distribution center should accommodate wholesalers and processors of all commodities in order to best serve the public and the food industry. Buyers should not find it necessary to visit several different locations to purchase a complete line of products. Various modes of transportation should be available for products, employees, and buyers.

Special consideration should be given to arranging facilities for maximum efficiency. Dealers in the same commodity should be located together to facilitate interdealer activities. Firms catering to buyers picking up their goods should be located

where the traffic generated will not interfere with an efficient flow of traffic for other firms in the center. Public warehouses should be strategically located to serve the entire market.

It is critical that sufficient land at a reasonable price be acquired at the time of initial purchase. This is particularly true in Cincinnati because the initial facilities should form a nucleus to which other wholesale food and food-oriented firms will relocate to establish a complete food distribution center.

The buildings must be designed to meet the specific needs of each type of wholesaler. Large-volume handlers and dealers involved in extensive processing operations will require buildings different from the small-volume handlers or those who do little or no processing. Ample space should be provided for unloading, processing, storage, order assembly, display and sales, and loading, and for restrooms and offices in all buildings. The buildings should have a simple, functional design that is relatively inexpensive to build and that is constructed to withstand continued heavy usage. Because the food industry and the methods of handling merchandise are changing, buildings must also be designed so they can be modified or expanded to meet future demands or changes.

In addition to suitable buildings, auxiliary facilities such as house tracks, team tracks, an unloading area for piggyback trailer and van containers, restaurants, public restrooms, and service facilities for motor equipment should be provided. Space should also be provided for supplementary organizations or related industries interested in locating in the center. Banks, offices, inspection services, communications centers, food brokers, and barber shops are services that might be interested in locating in the center. Adequate parking must be available for these services.

Any advantages of high-priced downtown land must be weighed against those of inexpensive rural land. Figure 6 shows a facility adjacent to the downtown area of Cincinnati. High costs required to amortize a large investment in high-priced land could offset savings from improved operating efficiency.

In appraising land cost for a food center, consideration should be given not only to the acquisition cost, but also to the cost of demolishing and removing structures that are already on a site and to any other possible costs involved in placing the land in condition to build. The costs for extending rail, streets, and utilities to the market should also be considered.

Sound management and financial planning are of major importance for the success of the market. The management should be strong enough to assist



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FIGURE 6.—Food distribution facility located near Cincinnati's downtown area.

associated members of the food industry in adhering to health, sanitation, fire, traffic, and policing regulations. The market should be operated without discrimination against any type of dealer or buyer, any form of transportation, or any source or area from which the products may originate. The firms operating in the market should be allowed the maximum degree of individual initiative within the framework of good business practices that benefit the entire market.

The board of directors or other management groups of the center should be interested in its overall financial success and should insure its proper operation. The board should represent the welfare of shippers, dealers, buyers, consumers, transportation agencies, and the appropriate agencies of Government.

Recommended Facilities and Acreage Requirements

The facilities recommended are dictated by the type of operation and the volume of food handled by those firms that indicated an interest in relocating on a consolidated food center.

Twelve firms, handling nearly one-quarter of a million tons of food a year, are included in the plans for the food center nucleus. The following facilities will provide for the immediate requirements of these firms:

1. One multiple-occupancy building, shared by several small-volume dealers, with 13 store units (one unit as a restaurant with a public restroom beneath) in 39,000 square feet of first-floor space.

2. Eight single-occupancy buildings for large-volume dealers, with a total of 815,000 square feet of first-floor space.

3. Double rail tracks to all buildings to provide a total house-track capacity of over 100 rail cars.

4. Paved streets 300 feet wide between facing buildings.

5. Paved service or cross-access streets 80 feet wide.

6. Parking areas for cars and trucks.

7. Specific areas designated for expansion of the proposed facilities.

8. An area for the construction of additional food and allied industries to form a complete food distribution center.

The Multiple-Occupancy Building

The multiple-occupancy building contains store units for individual dealers and can accommodate five of the relocating firms. Figure 7 shows a perspective of the multiple-occupancy building. Each unit has a partial mezzanine and is so designed that one unit can meet the needs of a small dealer while some multiple would be required for larger dealers. Thus, a larger dealer might have from two to five of these units. Firms requiring more than five units and those requiring specialized facilities usually can be accommodated more efficiently in single-occupancy buildings built to their specific needs.

The volumes of products handled and types of operations performed by the firms studied indicate that a unit 30 feet wide and 86 feet deep, with a 14-foot-wide rear platform, would be adequate. Ceiling height varies from 22 feet at the front to 21 feet at the rear. The floor of the unit is 45 inches above grade level. A mezzanine 30 feet wide by 17 feet deep is provided at the front of each unit for restrooms and offices. The area beneath the mezzanine could be used for order assembly and order checking.

Each unit contains 2,580 square feet of first-floor space, 420 square feet of rear-platform space, and 510 square feet of mezzanine space for a total of 3,510 square feet of floor space. Figure 8 shows a suggested design for the proposed unit.

Total space provided in the multiple-occupancy building is 39,000 square feet of first-floor space including platforms and 6,630 square feet of mezzanine space.

House tracks should be set in the pavement to permit access to the platform by truck and to facilitate street cleaning. A canopy should be used to shelter the rear platform at an elevation 15 feet 6 inches above grade; a canopy 6 feet wide and 14 feet 6 inches above the street is recommended for use over the front loading area. Both canopies should be cantilevered with additional support given by steel guy rods so that clear operating space is provided beneath. Their function is to protect workers and products in loading and unloading operations during inclement weather. Platform surfaces should be of nonskid concrete and should have about a 1-percent slope to the street to carry off water.

At the front of each unit are two doors for truck loading. These are 8- by 8-foot overhead doors. Vertical rubber bumper strips should be installed below these door openings to prevent damage from trucks. Vertical rubber bumper strips should also be installed along the rear platform. A 3-foot-wide door at street level opens to stairs leading to both the first floor of the unit and to the

mezzanine. An 8- by 8-foot sliding door protected by a guard rail provides access at the rear of the unit.

The storage requirements of a palletized handling system employing pallet racks three tiers high necessitate providing a floor with a capacity to handle a live load of 400 pounds per square foot. The mezzanine floor should be designed to support a live load of about 100 pounds per square foot. Floor surfaces should be of dustproof reinforced concrete with nonskid surfaces and should slope to floor drains.

Heat could be provided by blower-type space heaters. For general office work, such as would be done on the mezzanine, approximately 20 foot-candles of light intensity (unit of measure for illumination) with supplementary individual desk lighting is generally satisfactory. About 15 foot-candles of light intensity should be used in the general storage area.¹ Supplementary lighting for display, packaging, processing, loading, and unloading may be required. Warehouse lights should be placed directly over aisles for efficient and accurate order selection. A central control panel for utilities should be located inside the unit at the pedestrian entrance.

Partitions between individual dealers should be waterproof and of incombustible materials and

¹ Lighting estimates are based on information from the Illuminating Engineering Society Lighting Handbook and should be considered only as guides to specific lighting requirements of individual firms.

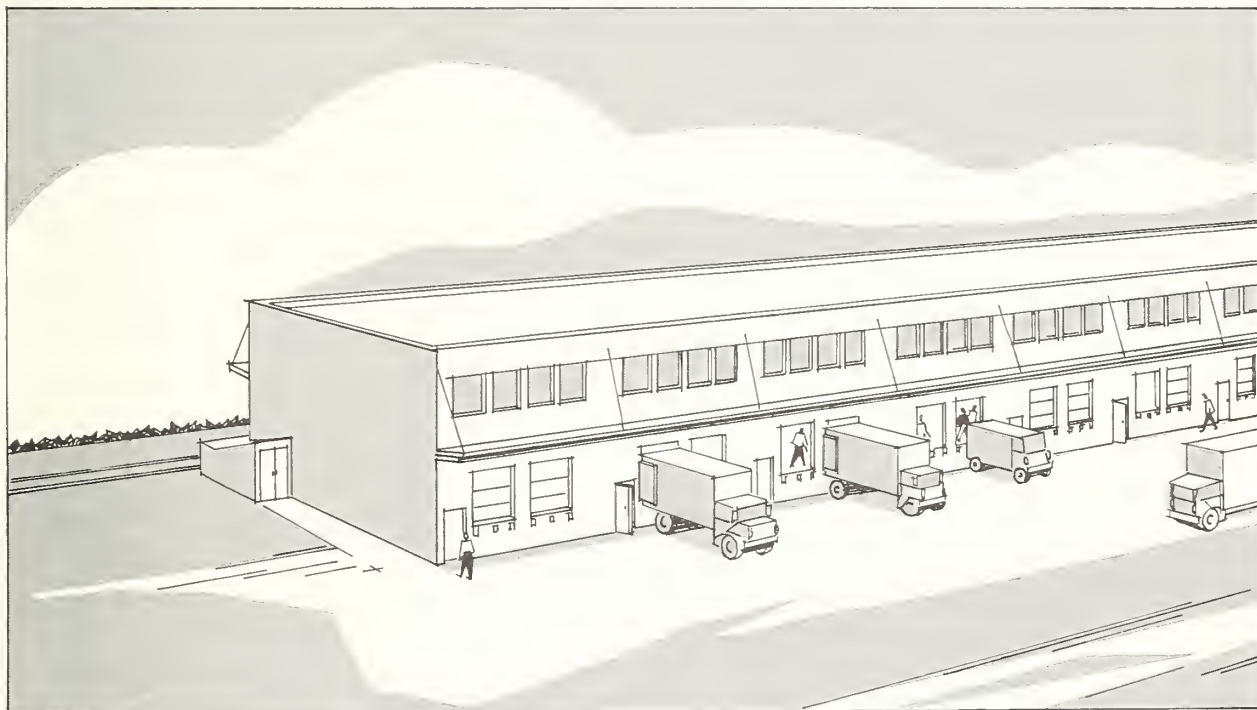
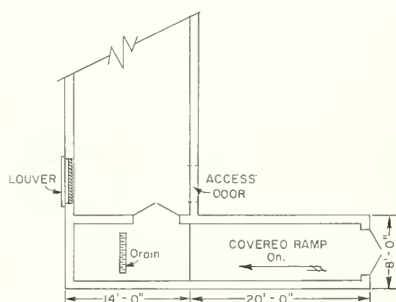
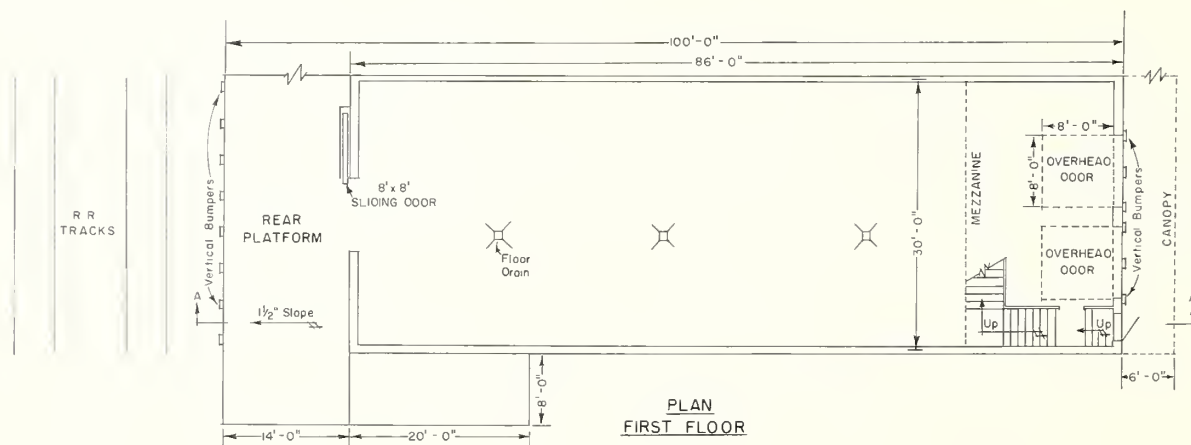
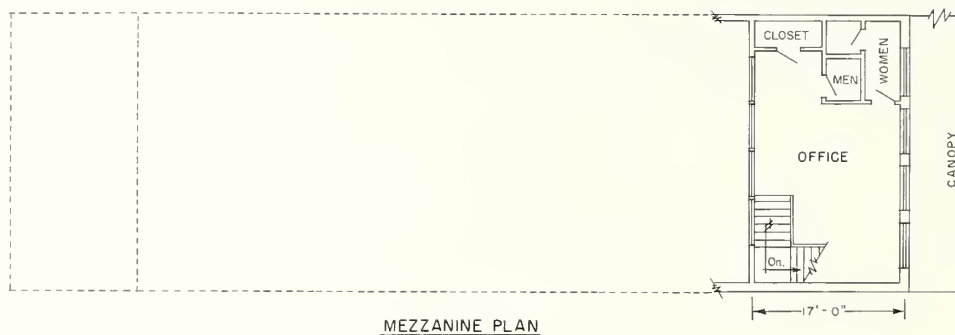
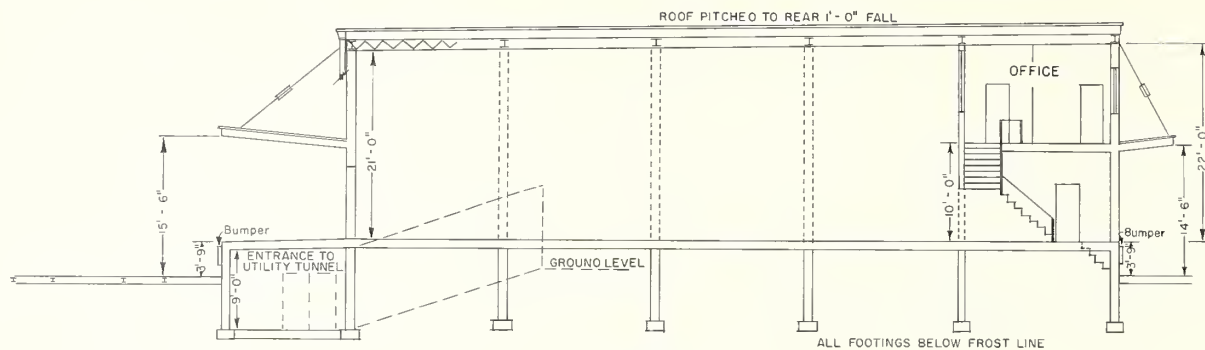


FIGURE 7.—A perspective of a multiple-occupancy building recommended for food distribution center in Cincinnati.



Scale of Feet
0 5 10

FIGURE 8.—First-floor and mezzanine plans, with section of a unit, in the multiple-occupancy building recommended for Cincinnati's proposed food distribution center.

should be nonbearing to allow for future space adjustments between firms.

The refrigeration requirements of the firms sharing the facility should be determined before construction plans are completed. This determination will facilitate the proper installation of cooler and freezer insulation during the facility's construction. Coolers and freezers are not included in the units because refrigeration requirements vary. Additional information pertaining to refrigeration is found in the appendix.

Each firm's refrigeration equipment could be placed in a general utility tunnel under the rear platform. This tunnel should extend the length of the platform, should have at least 9 feet of inside clearance from floor to ceiling, and should have an access door at one end.

The interior layout of a unit or units should be designed to meet the specific requirements of individual firms. Some general recommendations for developing interior layouts and mechanized handling systems are found in the appendix.

Single-Occupancy Buildings

Seven firms would require eight individual buildings to accommodate their volumes and operations. (One firm would require two facilities for its diverse operations.) Although the actual design of each of these buildings should be adapted to the individual tenant's requirement, suggestions as to their shape have been incorporated into the master plan.

The eight single-occupancy buildings range in size from 10,000 square feet to 260,000 square feet. These eight buildings provide a total of 815,000 square feet of first-floor area.

Streets and Parking Areas

All major streets in the food center should be paved to carry heavy vehicular traffic and to provide drainage away from the buildings to drains in the streets. Paving could be of a blacktop combination that would consist of a foundation of 7 inches of gravel or crushed rock, 4 inches of macadam base, and 2 inches of asphaltic concrete surface. For areas where oil or gasoline drippings would be excessive, concrete paving 6 inches thick is suggested because of the softening or dissolving effect these liquids have upon asphalt.

The 300-foot width recommended for streets between facing buildings provides space for large trucks to maneuver and park perpendicular to the platforms on both sides of the street and also leaves space down the center of the street for parking. Access or cross streets 80 feet wide should be provided to facilitate efficient traffic flow and to permit rapid access to the various sections of the market.

Parking areas are provided near buildings for convenience but should not interfere with traffic flow or loading and unloading operations. To save space and insure orderly parking, all parking slots should be lined off with a heavy-duty paint on the blacktop surface. Parking requirements should be determined at the outset and expansion areas should be provided. Parking is critical and should be considered an integral part of the market.

Other Facilities

A restaurant is provided in the proposed master plan. This restaurant is in one unit of the multiple-occupancy building. A public restroom should be located in the basement of the restaurant.

Brokers, market management, and others requiring offices when the market is first formed could be provided with space in the public warehouses. As the market develops, a building specifically designed for offices will be required and can be located as shown in the master plan.

Banking facilities are important to the food wholesalers and should be provided in the future. A gas station, maintenance and repair garage, and a communications center are other possible service facilities that could locate on the food center.

Acreage Required

Each building in a food distribution center should have space for expansion, particularly single-occupancy buildings. Parking areas should be provided to prevent encroachment on areas reserved for expansion. The nucleus firms for a food distribution center would require 100 acres for the buildings and expansion recommended.

Even though only 12 firms are considered for location in the center, additional food firms and allied food industries may wish to relocate there. For this reason more acreage should be purchased than initially needed. Failure to acquire sufficient land at the outset can limit the potential development of the market or result in excessive costs to prospective new tenants. At least double the acreage requirements of the nucleus firms should be acquired to accommodate foreseeable future development.

It is important that a master plan for development of a complete food distribution center be adopted so that orderly organization of facilities may be maintained. Facilities must be arranged so that both initially and with future expansion, they form an orderly and efficient food distribution center.

Figure 9 illustrates a possible master plan that would include the nucleus and future development area. The nucleus would require 100 acres and the complete master plan would require about 215 acres.

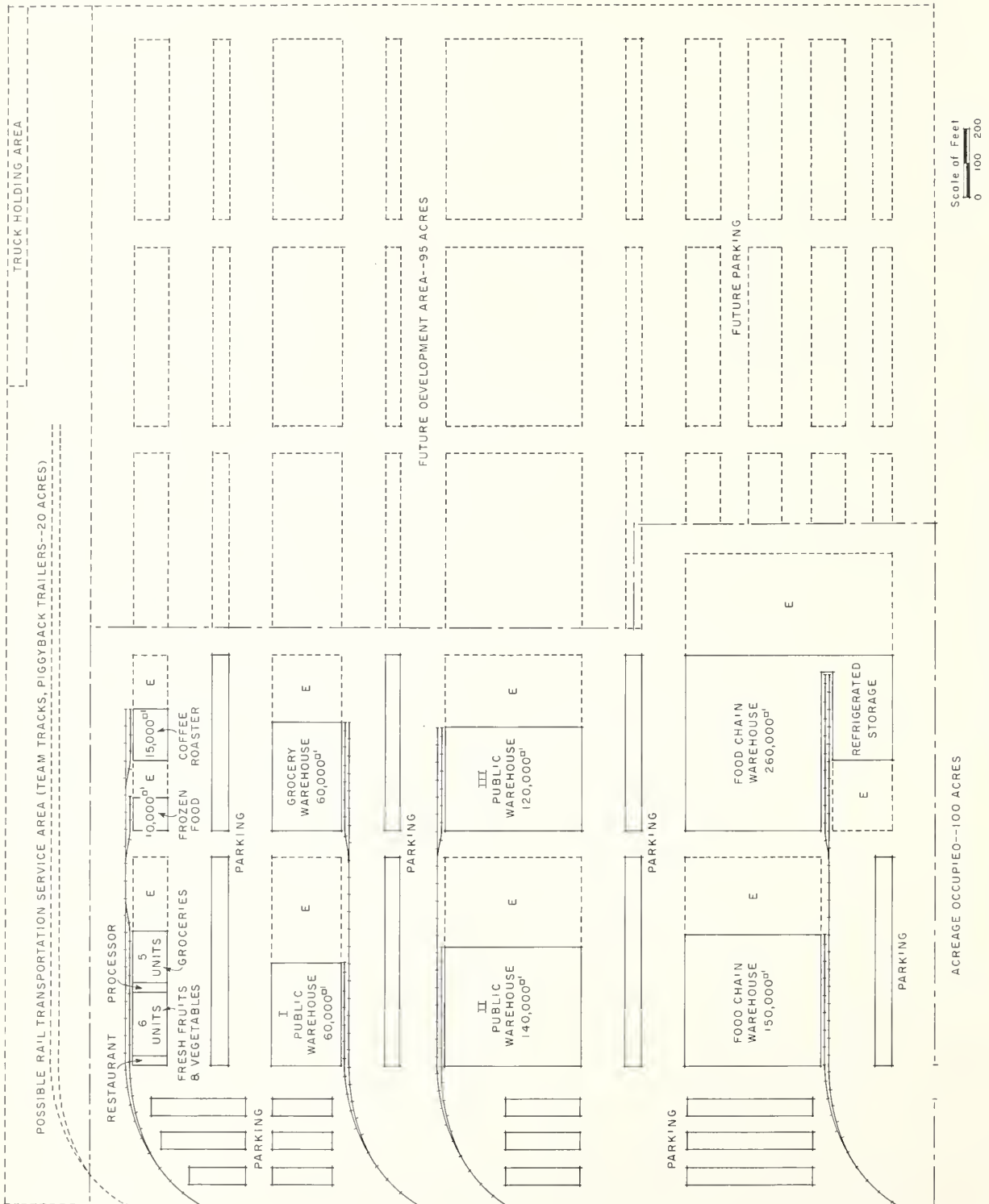


Figure 9.—A master plan for Cincinnati's proposed food distribution center.

Multiple-occupancy buildings generally house firms that are traffic generators. Some single-occupancy buildings that perform service functions are also in this category. These facilities are located near cross streets to permit rapid orderly truck movement within the center or general distribution from it.

Should a food industry heavily oriented to rail transportation relocate to the food center, a service area might be required. This service area could include team tracks, freight unloading facilities for piggyback trailers or van containers, a truck terminal, and a truck-parking area. Such a transportation service area is shown at the top of figure 9.

The food-chain facilities should be located where they would have adequate space for expansion. Although they are an integral part of the market, their facilities should be located away from the multiple-occupancy buildings to distribute traffic evenly.

As the market expands, buildings of similar design should be grouped together. Each group should have its own streets, parking area, and expansion area, but should still be integrated into the total center. Similar size buildings, within groups, should be aligned to avoid wasted space.

Tracks should be arranged to require a minimum of trackage and switches. Double-rail tracks are necessary for holding cars on one track behind the buildings while cars on the other track are switched. For extra track capacity during peak periods, the switching track could be used to hold cars.

Vehicle parking areas should be maintained in proximity to facilities as the center is expanded. This parking arrangement is critical to the efficient operation of the market.

Expanding the Center

Initially, the project could be developed either by a private developer or through a nonprofit corporation formed by the participating firms. Possibly, the center could be developed with a combination of these two methods: The corporation would assume responsibility for the initial development of the nucleus and the private developer would be responsible for the future growth area. If such a plan were developed, certain restrictions should probably be applied to the developer. These restrictions would include restricting space to food and food-oriented industry and maintaining orderly growth within the framework of a master plan along the lines of an industrial park.

After the initial construction has been completed and the center is in operation, the developer could take control of the land allocated for future development. He should be free to meet the requirements of the potential tenant of the area. Any tenant locating in this area would be expected to assume his responsibility in overall market management costs. The future tenant should also expect to assume a pro rata share of such initial development costs as lead-in rail tracks and the land they occupy, parking areas, streets, and sewerage lines.

SELECTING A SITE

Interest in the proper location of a food center would be widespread. Firms operating in the center will be directly affected by costs that vary according to various aspects of the site. The municipality involved will have a definite interest in the center's location because of its concern for land use, zoning, traffic control, street and highway planning, police and fire protection, health and other regulations, and services it must provide. Local producers, because of the costs necessary to transport products to the market, will also be interested. The change in working conditions and transportation to the market will affect employees in the center. Public service firms such as transportation agencies, utilities, insurance companies, and other service-oriented groups and firms should give full and careful consideration to the development. Indirectly, consumers—who over a period of years will help pay for the market by the purchase of food products—have a concern in the center's location.

Factors to Be Considered

Certain factors should be considered when evaluating particular sites.

Flooding Problems

Cincinnati is in the Ohio Valley on the Ohio River. The Great Miami and Little Miami Rivers, Mill Creek, and other smaller tributaries empty into the Ohio River in the area. A water level of about 52 feet at Cincinnati is the signal that the Ohio River is in a crest stage before flooding. When flooding does occur, the river backs up into its tributaries, creating flood conditions at many points. Heavy rains and snowfalls cause flash floods. Although such measures as flood walls, dikes, dams, pumping, and dredging have some success, flooding still represents a major problem in the Greater Cincinnati area. Therefore, in reviewing a site,



FIGURE 10.—Flood conditions in Cincinnati along the Ohio River.

BN-32853

flooding conditions must be considered. Figure 10 shows flood conditions in a food area along the river.

Accessibility of Transportation

The nucleus firms received 28 percent of their total receipts by rail, including house tracks, team tracks, and piggyback trailers. Therefore, availability of rail access is essential for any sites considered. It should be possible for cars from any railroad to be moved to the food distribution center. Those responsible for developing the market should be assured that rail access will be adequate before final arrangements are made for the selection of a site.

In view of the large percentage (72 percent) of direct truck receipts, and the fact that all the food that moves through the market is distributed by trucks, the commercial trucking zone boundaries should be considered. A site located with immediate access to the interstate highway system would be best. If this is not possible, connecting routes should provide access to major highway arteries. Interstates 71, 74, and 75 serve the Cincinnati area as high-speed highways and provide quick access to more distant markets.

When completed, the proposed Circle Freeway

(Interstate 275) will encircle the Cincinnati area. This freeway will connect sections of the tristate area with a high-speed limited access highway. The city's center area will be accessible via arterial highways bisecting this route.

No receipts by air or boat were reported by the firms. Estimates indicate that the food industry receipts by these methods would be negligible; therefore, direct access to air and boat transportation facilities is not a requirement.

Availability of Land

Adequate land is a broad, general term when being applied to a food center, especially when applied to the nucleus of such a center with an objective of growth to a complete wholesale food distribution center. Assembling parcels of land may be complicated when dealing with a number of separate owners with small parcels. Therefore, if possible, the total acreage needed should be purchased from one owner or a small number of owners who are willing to sell their property at a reasonable price.

Cost of Land

Although the selling price of the site is an important factor, it may not represent the major

item of cost when land cost is distributed over the period of amortization. Further, in nearly all areas where markets have been constructed, the surrounding land's market value has increased. Thus, sufficient land should be purchased at the outset, as the total cost will be less than it is likely to be ever again. If possible, land should be available contiguous to, or at least in the vicinity of, the site selected, to provide for expansion.

The physical features of a site and its shape are important. The costs of grading, filling, piling, and removal of such obstructions as trees and buildings could cost more than the land itself. A vital factor, therefore, is the cost of the land that is ready for use. Test borings to determine subsoil conditions should be made before the purchase of any site. The shape of a site should permit the highest degree of utilization for the arrangement of facilities. Irregularly shaped sites do not lend themselves to this requirement as well as rectangular tracts, preferably square or nearly square. Ineffective land use will increase the total cost of the food center, increase ownership costs, and inconvenience users of the market.

Land Use and Zoning

The use made of land before purchase can be an important factor in selecting a site. A vacant area with sufficient available acreage to develop a food center in the city of Cincinnati is nearly impossible to obtain. To acquire sufficient acreage within the city, it would be necessary to demolish structures on a selected site, probably through extensive use of eminent domain proceedings. Whether such a program would be successful or the final land utilization economical is doubtful. Therefore, as an alternative to costly urban areas where lengthy litigation proceedings could be involved, the planners should consider an area where local land use programs permit this type of development.

Zoning of the site selected should be considered so that surrounding properties do not detract from the center and the center does not detract from surrounding properties. Zoning regulations vary from area to area; however, a light industrial zoning classification is generally required for development of a food distribution center since such a center is primarily warehouse storage. Should certain types of food processing be contemplated in the center, such as livestock slaughtering, special zoning classifications may be necessary.

Availability of Utilities

Accessibility to public utilities such as water, gas, electricity, and sewerage systems affects the suitability of a site. Where the urban area is expanding, some utilities may not be immediately

available but may be planned. Utilities should be sufficient for commercial service, and should be readily accessible. Under certain conditions the cost for extension of utilities must be borne by the developer; under other conditions the cost may be paid by the city or county as a public improvement.

Avoidance of Nonmarket Traffic

A great deal of vehicular traffic is necessary for receiving and distributing food at wholesale facilities, and traffic congestion is common at some locations. Vehicles not related to market business further complicate the traffic problem. Therefore, a site should be selected whose location will minimize the confusion caused by these two types of traffic.

Convenience to Customers

Over 95 percent of the tonnage handled by the nucleus firms is delivered by the firms to their customers. Many of these customers are retail stores, restaurants, hotels, and institutions. The rest of the food handled is picked up by the customers. For these reasons, a food distribution center must be located in an area where a minimum of travel time is required both by buyers in shopping and sellers in distributing commodities. The center of retail distribution is at approximately the geographic center of Hamilton County. The study indicated a northward trend in out-of-town business. Out-of-town business must be considered as well as distribution to local business. The present or proposed highway system for the area could make nearly any site adjacent to this system convenient for both out-of-town buyers coming to the market and distributors in the market center.

Other Factors

The potential market area to be served is another criterion to be used in selecting a site. The vast new network of interstate highways that has been completed or is under construction will make the time-distance factor negligible. Figure 11 illustrates the time-distance factor relative to populations in proximity to Cincinnati. The northward trend of distribution, along with a similar population growth pattern, indicate a northern location. Further, the accessibility of Middletown, Hamilton, Dayton, and Columbus, via high-speed expressways, makes the northern area even more attractive.

The possibility of air pollution is another factor that should be considered in selecting a site. Noxious odors or air contaminants could permeate food.

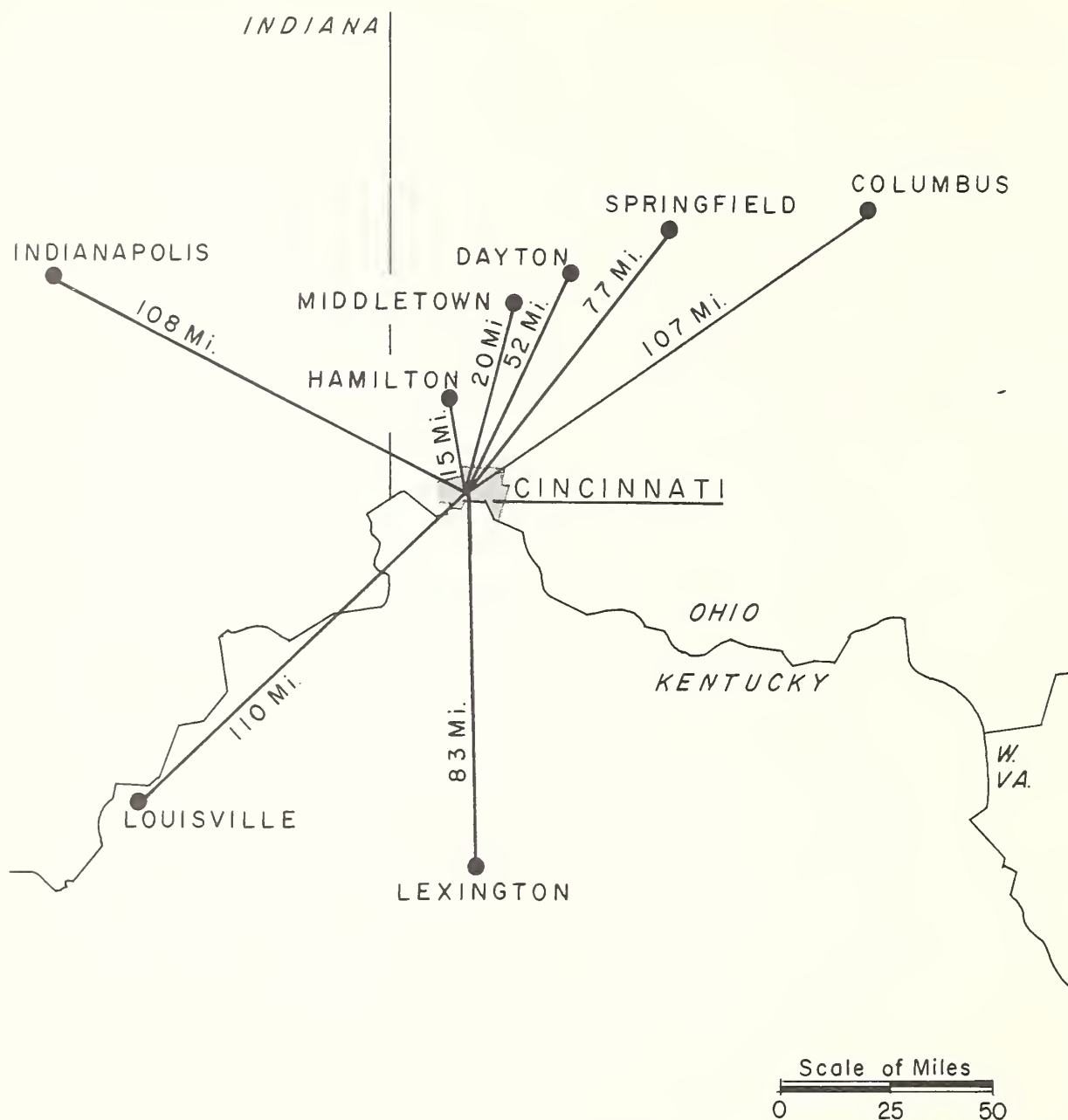


FIGURE 11.—Market area study of distances from Cincinnati to the nearest sizeable cities.

Possible Sites

Over 20 sites suggested by various organizations and interested persons were considered. Most of these were eliminated because they were too small, lacked rail service, had serious flooding problems, or failed to meet some other vital requirement.

Three sites believed to have potential for a market center were analyzed—(1) Princeton Road, (2) Windisch Road, and (3) Mt. Carmel Road. Figure 12 shows the location of these sites and the major transportation arteries. A summary of the data pertaining to the three sites is given in table 1.

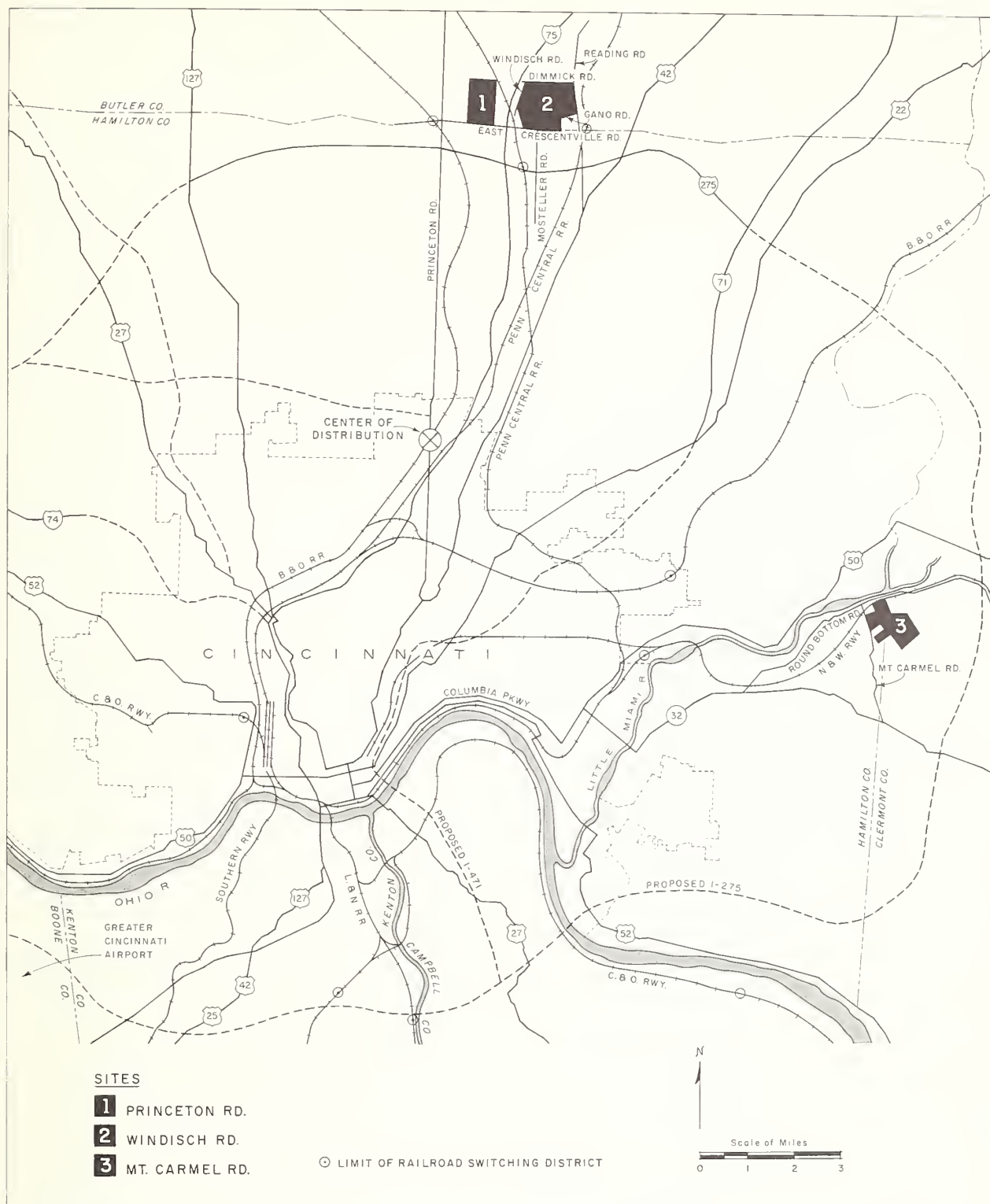


TABLE 1.—Three possible sites for nucleus of a food distribution center proposed for the Cincinnati area

Site	Boundaries	Acreage	Estimated cost per acre of ready-to-use land	Present land use	Topography and soil condition ¹	Access to rail transportation	Access to highways	Distance from retail center of distribution (miles)	Total cost of land
Princeton Road---	North: about 3,400 feet above and parallel to East Crescentville Road. East: about 4,600 feet from and parallel to Princeton Road. West: 2,000 feet from and parallel to Princeton Road. South: East Crescentville Road.	204	\$15, 000	Agricultural purposes.	Level to gently rolling. Flooding not a problem.	Penn Central Railroad serves area. Outside switching limits.	East Crescentville Road to I-71 and I-275. Within commercial trucking zone.	7	\$3, 060, 000
Windisch Road---	North: Dimmick Road--- East: Reading Road. West: Windisch Road. South: East Crescentville and Gano Roads.	221	12, 000	Agricultural purposes.	Level to gently rolling. Flooding not a problem.	Penn Central Railroad could serve site. Outside switching limits.	East Crescentville Road to I-71, I-75 or I-275. Within commercial trucking zone.	9	2, 652, 000
Mount Carmel Road.	North: Norfolk and Western Railway tracks. East: about 4,800 feet from Mount Carmel Road. West: Mount Carmel Road. South: about 4,000 feet from Norfolk and Western Railway tracks.	198	8, 000	Largely vacant, wooded land; occasional housing and farmland.	Rough to rolling with second growth trees and shrubs. Flooding could be a problem.	Norfolk and Western Railway directly serves area. Outside switching limits.	Highway access to site is poor; completion of Circle Freeway (I-275) should improve highway access. Outside commercial trucking zone.	16	1, 584, 000

¹ Subsoil conditions cannot be determined until test borings are completed.

Princeton Road

This site, which has one owner, is in Butler County, just north of the Hamilton County line. Its boundaries are: (1) North—about 3,400 feet above and parallel to East Crescentville Road; (2) east—about 4,600 feet from and parallel to Princeton Road; (3) west—about 2,000 feet from and parallel to Princeton Road; and (4) south—East Crescentville Road. The site is approximately rectangular and contains about 204 acres. It is approximately 7 miles north by northeast of the center of retail distribution.

A 12-inch water main in East Crescentville Road would make water available. Gas and electric service is also available. Although storm and sanitary sewers do not reach the site, a proposal for extending this service has been approved by the county. The area is presently farmland. However, it is zoned M-2 for general industry, which includes general manufacturing and heavy industry.

The site could be described as level to gently rolling. It could probably be graded and then leveled with little or no outside fill. Test borings would be necessary to determine piling requirements. Flooding does not represent a major problem.

The Penn-Central Railroad could serve this area from its main line east of the site. The site is served by the narrow East Crescentville Road, which does not lend itself to heavy traffic. However, there are plans to widen this road, which provides direct access to the expressway system. The area is within the Cincinnati commercial trucking zone, but outside present railroad switching limits. Intrastate bus service is the only public transportation available. Local telephone service is offered throughout Greater Cincinnati.

Because of its location, nonmarket traffic would probably not create a problem for users of the site.

The cost of this land, graded and ready to use, is about \$15,000 per acre or about 35 cents per square foot. This estimate does not include the cost of piling if it should be required. The total cost of this 204-acre site would be approximately \$3,060,000.

Windisch Road

This site in Butler County is about 9 miles north by northeast of the center of retail distribution and contains approximately 221 acres. It is bounded on the north by Dimmick Road, on the east by Reading Road, on the south by East Crescentville and Gano Roads, and on the west by Windisch Road. This land is farmland and is zoned M-2 for general industry.

The terrain is generally level to gently rolling. Any grading and filling necessary could probably be done without using outside fill. Test borings should be made to determine any piling requirements. Flooding is not a major problem in this area.

A 6-inch-high pressure gas line in Mosteller Road is available to a point one-half mile south of the site. Electric powerlines can be extended from a point approximately 1½ miles north. A 12-inch water main is in Mosteller Road about 1,500 feet south of the site. No sewerage systems are available.

Penn Central Railroad access would be by either crossing at Windisch Road to the west or crossing at East Crescentville Road to the south. Tracks are also along the eastern side beyond Reading Road. Access to the expressway system would be via the two-lane East Crescentville Road. Should this road be widened, access to the site would be improved. The site is within the commercial trucking zone, but outside railroad switching limits. Nonmarket traffic would not be a problem. Public transportation would be by an intrastate bus service. Telephone calls to downtown Cincinnati do not require toll charges.

The approximate cost of this single-owner site, graded and ready to use, is about \$12,000 per acre or 28 cents per square foot, exclusive of piling costs. The acquisition cost of the 221-acre tract is about \$2,652,000.

Mt. Carmel Road

This irregularly shaped site contains about 198 acres, has one owner, and is about 16 miles southeast of the center of retail distribution. Approximately 41 percent of this land is in Clermont County and the balance is in Hamilton County. The approximate boundaries are: North—the Norfolk and Western Railway tracks; east—about 4,800 feet from Mt. Carmel Road; west—Mt. Carmel Road; and south—about 4,000 feet from the Norfolk and Western Railway tracks.

A 12-inch waterline is adjacent to the property in Mt. Carmel Road. Gas and electricity are available. No public sewerage facilities are available. The area is zoned M-2 for general industry.

Present land use includes mostly vacant wooded land with occasional housing and farmland. Flooding could cause problems, as the little Miami River, located directly across from the site, occasionally overflows. The topography is rough to rolling, with second growth trees and shrubs. Considerable grading and filling would probably be required. Subsoil conditions should be determined from test borings.

The Norfolk and Western Railway, with its main-line tracks as the northern boundary, directly

serves the site. Highway access is via the narrow two-lane Round Bottom and Mt. Carmel Roads. These roads provide access to a rather limited highway network in this area. The arteries leading to and from the city are saturated with traffic at rush hours. Further, one of the major arteries, Columbia Parkway, is barred to truck traffic. The highway access to this site will be improved as the construction on the Circle Freeway (Interstate 275) is completed in the vicinity. This site is outside both the railroad switching limits and the commercial trucking zone. Nonmarket traffic would not be a problem. No public transportation is available. Toll telephone charges are not necessary for calls to downtown Cincinnati.

The cost of this land is about \$8,000 per acre or \$0.18 per square foot of land ready for use. This does not include piling costs. The total cost of the 198-acre tract is estimated to be \$1,584,000.

ESTIMATED INVESTMENT COST

Land and facilities are the two major components of the initial investment in a food distribution center. Costs can vary considerably depending upon the site selected and the construction costs at the time facilities are built.

The cost per acre of ready-to-use land was estimated to range from \$8,000 to \$15,000. For purposes of this report, the cost at each site of 100 acres upon which the initial facilities would be constructed is estimated to be:

	<i>Dollars</i>
Princeton Road-----	1,503,000
Windisch Road-----	1,202,400
Mt. Carmel Road-----	\$01,600

These estimates were based on reviews of real estate transactions in the area, interviews with employees of local real estate and development firms, and estimates made by city officials familiar with land transactions. The estimates do not include the costs of extending gas and electric lines, sewers, railroad tracks, pilings, etc.

Building cost estimates are based upon Cincinnati construction indices for May 1967 and assume "light mill," brick and steel construction, with a 6-inch reinforced concrete slab floor. Estimates made by local contractors, engineers, architects, bankers, and railroad officials supplemented these data with other specific cost information.

Estimates for the multiple-occupancy building are for a completed structure and include in each unit a mezzanine, toilets, fluorescent lighting fixtures, display lighting outlets, space heaters, and lighting for platforms. They do not include such features as partitioned offices, insulation, refrigeration, or specialized equipment.

Sites Summary

It is beyond the scope of this report to select a specific site. Any of the sites discussed could be developed into a complete food distribution center for Cincinnati from the proposed nucleus. Although these sites are not the only ones available, they are representative of those that could be considered adequate.

Each of the sites has specific advantages and disadvantages. Two are in Butler County and one is divided between Hamilton County and Clermont County. Two are in the direction of local population growth whereas the other offers a lower acquisition cost. Each site has a single owner. Zoning is similar and would not present a problem. Two sites are outside the railroad switching limits but within the commercial trucking zone; the third is outside both limits.

The cost estimates for the single-occupancy buildings are also for completed structures. They do not include mezzanines, refrigeration, or other specialized requirements.

Paving estimates are prorated for each building to provide a fair share of the cost of market streets and parking areas. Paving costs are for a foundation composed of 7 inches of gravel or crushed rock, 4 inches of a macadam base, and 2 inches of asphaltic concrete.

Lead-in costs on the site for railroad tracks and sewers (sanitary and storm) are prorated on the same basis as paving. The cost of house tracks to serve a particular building or buildings is charged to the facilities served.

Rates used for the architect's fee (6 percent), the construction loan (6½ percent), and the contingency allowance (10 percent) are typical rates charged for such construction in the Cincinnati area. The rate for the construction loan is assumed to be based on the total cost of the loan and is not an annual interest rate.

Estimated construction costs are not intended to replace firm estimates by local engineers, architects, and contractors at the time of construction and should be considered only as illustrative.

Table 2 (p. 25) gives a summary of the estimated investment costs for land and facilities. The following tabulation shows the construction costs for the facilities proposed and the arrangement recommended in the master plan, including the architect's fee, the construction loan, and the contingency allowance.

Multiple-Occupancy Facilities

1. Buildings: ¹	
One multiple-occupancy building having 13 units (one unit used as a restaurant) with mezzanines and a utility tunnel under the rear platform with a ramp at the end to provide access to the tunnel. Cost of ramp \$500. Each unit has 3,000 sq. ft. of first-floor space @ \$10.47 per sq. ft. (includes cost of mezzanine) plus 420 sq. ft. of space under the rear platform @ \$2.50 per sq. ft., or a total cost of \$32,460 per unit ² -----	\$422, 480
Sprinkler system (first floor and mezzanine)—40,170 sq. ft. @ \$0.25 per sq. ft.-----	10, 042
Basement under the restaurant, 24 feet by 30 feet, with public toilet facilities and served by a stairway-----	8, 730
2. Other facilities:	
Trackage ³ —2,329 ft. @ \$14 per linear foot.---	32, 606
Railroad switch ³ —1 conventional single throw @ \$4,000 each-----	4, 000
Paving (blacktop combination)—32,521 sq. yd. @ \$3.50 per sq. yd.-----	113, 824
Sewers: ⁴	
Storm—1,056 ft. of 15-inch @ \$6.35 per ft.---	6, 706
Sanitary—350 ft. of 12-inch @ \$6.70 per ft.---	2, 345
Total construction cost of building and other facilities-----	600, 733
3. Associated construction costs: ⁵	
Architect's fee-----	36, 043
Construction loan-----	41, 391
Contingency allowance-----	67, 817
Total investment cost of multiple-occupancy facilities-----	745, 984

Single-Occupancy Facilities

1. Frozen food:	
A. Buildings: ¹	
One building containing 10,000 sq. ft. with a 21 ft. ceiling height or 210,000 cu. ft. @ \$1.113 per cubic ft. (Includes insulation cost and refrigeration cost.)-----	\$233, 730
B. Other facilities:	
Trackage ³ —626 ft. @ \$14 per linear ft.---	8, 764
Railroad switch ³ —1 conventional, single throw @ \$4,000 each-----	4, 000
Paving (blacktop combination)—9,056 sq. yd. @ \$3.50 per sq. yd.-----	31, 696
Sewers: ⁴	
Storm—378 ft. of 15-inch @ \$6.35 per ft.---	2, 400
Sanitary—140 ft. of 12-inch @ \$6.70 per ft.-----	938
Total construction cost of building and other facilities-----	281, 528
C. Associated construction costs: ⁵	
Architect's fee-----	16, 891
Construction loan-----	19, 397
Contingency allowance-----	31, 782
Total investment cost of frozen-food facilities-----	349, 598

Single-Occupancy Facilities (Cont'd.)

2. Coffee roaster:	
A. Buildings: ¹	
One building containing 15,000 sq. ft. @ \$10.47 per sq. ft.-----	157, 050
Sprinkler system—15,000 sq. ft. @ \$0.25 per sq. ft.-----	3, 750
B. Other facilities:	
Trackage ³ —578 ft. @ \$14 per linear ft.---	8, 092
Railroad switch ³ —1 conventional, single throw @ \$4,000 each-----	4, 000
Paving (blacktop combination)—13,583 sq. yd. @ \$3.50 per sq. yd.-----	47, 540
Sewers: ⁴	
Storm—378 ft. of 15-inch @ \$6.35 per ft.---	2, 400
Sanitary—100 ft. of 12-inch @ \$6.70 per ft.-----	670
Total construction cost of building and other facilities-----	223, 502
C. Associated construction costs: ⁵	
Architect's fee-----	13, 410
Construction loan-----	15, 399
Contingency allowance-----	25, 231
Total investment cost of coffee roaster facilities-----	277, 542
3. Grocery:	
A. Building: ¹	
One building containing 60,000 sq. ft. @ \$10.47 per sq. ft.-----	628, 200
Sprinkler system—60,000 sq. ft. @ \$0.25 per sq. ft.-----	15, 000
B. Other facilities:	
Trackage ³ —1,480 ft. @ \$14 per linear ft.---	20, 720
Railroad switch ³ —1 conventional, single throw @ \$4,000 each-----	4, 000
Paving (blacktop combination)—28,679 sq. yd. @ \$3.50 per sq. yd.-----	100, 376
Sewers: ⁴	
Storm—650 ft. of 15-inch @ \$6.35 per ft.---	4, 128
Sanitary—290 ft. of 12-inch @ \$6.70 per ft.-----	1, 943
Total construction cost of building and other facilities-----	774, 367
C. Associated construction costs: ⁵	
Architect's fee-----	46, 462
Construction loan-----	53, 354
Contingency allowance-----	87, 418
Total investment cost of grocery facilities-----	961, 601

4. Public warehouse I:

A. Buildings: ¹	
One building containing 60,000 sq. ft. @ \$10.47 per sq. ft.-----	628, 200
Sprinkler system—60,000 sq. ft. @ \$0.25 per sq. ft.-----	15, 000
B. Other facilities:	
Trackage ³ —17,937 ft. @ \$14 per linear foot-----	25, 120
Railroad switch ³ —1 conventional, single throw @ \$4,000 each-----	4, 000
Paving (blacktop combination)—37,569 sq. yd. @ \$3.50 per sq. yd.-----	131, 488

See footnotes at end of tabulation.

See footnotes at end of tabulation.

Single-Occupancy Facilities (Cont'd).

Sewers: ⁴	
Storm—850 ft. of 15-inch @ \$6.35 per ft	3,953
Sanitary—590 ft. of 12-inch @ \$6.70 per ft	3,953
Total construction cost of buildings and other facilities	813,159
C. Associated construction costs: ⁵	
Architect's fee	48,789
Construction loan	56,027
Contingency allowance	91,780
Total investment cost of public warehouse I	1,009,755
5. Public warehouse II:	
A. Building: ¹	
One building containing 140,000 sq. ft. @ \$10.47 per sq. ft.	1,465,800
Sprinkler system—140,000 sq. ft. @ \$0.25 sq. ft.	35,000
B. Other facilities:	
Trackage ³ —17,937 ft. @ \$14 per linear foot	25,120
Railroad switch ³ —1 conventional, single throw @ \$4,000 each	4,000
Paving (blacktop combination)—53,826 sq. yd. @ \$3.50 per sq. yd.	188,391
Sewers:	
Storm—950 ft. of 15-inch @ \$6.35 per ft.	6,032
Sanitary—640 ft. of 12-inch @ \$6.70 per ft.	4,288
Total construction cost of building and other facilities	1,728,631
C. Associated construction cost: ⁵	
Architect's fee	103,718
Construction loan	119,103
Contingency allowance	195,145
Total investment cost of public warehouse II	2,146,597
6. Public warehouse III:	
A. Buildings: ¹	
One building containing 120,000 sq. ft. @ \$10.47 per sq. ft.	1,256,400
Sprinkler system—120,000 sq. ft. @ \$0.25 per sq. ft.	30,000
B. Other facilities:	
Trackage ³ —1,480 ft. @ \$14 per linear foot	20,720
Railroad switch ³ —1 conventional, single throw @ \$4,000 each	4,000
Paving (blacktop combination)—39,498 sq. yd. @ \$3.50 per sq. yd.	138,243
Sewers: ⁴	
Storm—750 ft. of 15-inch @ \$6.35 per ft.	4,762
Sanitary—390 ft. of 12-inch @ \$6.70 per ft.	2,613
Total construction cost of building and other facilities	1,456,738

See footnotes at end of tabulation.

Single-Occupancy Facilities (Cont'd.)

C. Associated construction costs: ⁵	
Architect's fee	87,404
Construction loan	100,369
Contingency allowance	164,451
Total investment cost of public warehouse III	1,808,962
7. Food chain:	
A. Buildings: ¹	
One building containing 150,000 sq. ft. @ \$10.47 per sq. ft.	1,570,500
One building containing 260,000 sq. ft. @ \$10.47 per sq. ft. ⁶	2,722,200
Sprinkler system—350,000 sq. ft. of non-refrigerated space @ \$0.25 per sq. ft.	87,500
B. Other facilities:	
Trackage ³ —3,914 ft. @ \$14 per linear foot	54,796
Railroad switches ³ —2 conventional, single throw @ \$4,000 each	8,000
Paving (blacktop combination)—121,580 sq. yd. @ \$3.50 per sq. yd.	425,530
Sewers: ⁴	
Storm—2,050 ft. of 15-inch @ \$6.35 per ft.	13,017
Sanitary—1,055 ft. of 12-inch @ \$6.70 per ft.	7,068
Total construction cost of buildings and other facilities	4,888,611
C. Associated construction costs: ⁵	
Architect's fee	293,317
Construction loan	336,825
Contingency allowance	551,875
Total investment cost of food chain	6,070,628
Total investment cost of single-occupancy facilities	12,624,683
Total investment cost of all proposed facilities	13,370,667

¹ Costs are based on Cincinnati construction indices, May 1967.² Includes the cost of the mezzanine.³ Linear feet of trackage includes the pro rata share of lead-in tracks. The costs of tracks and switches are based on information supplied by railroads.⁴ Paved invert corrugated steel pipe. Excavating costs would vary with soil conditions for this example, based on reasonable digging conditions at an average depth of 5 feet.⁵ Associated construction costs are estimated as follows: Architect's fee=6 percent of buildings and other facilities cost.

Construction loan=6½ percent of buildings and other facilities cost and architect's fee.

Contingency allowance=10 percent of buildings and other facilities cost, architect's fee, and construction loan.

⁶ Detailed refrigeration costs are not included because data concerning different types of refrigerated products to be handled were insufficient.

TABLE 2.—*Summary of estimated investment cost for a nucleus of a food distribution center proposed for the Cincinnati area, by type of facility and by site*¹

Type of facility	Princeton Road	Windisch Road	Mount Carmel Road
Multiple occupancy:			
Facilities ²	\$745, 984	\$745, 984	\$745, 984
Land (8.7 acres).....	130, 500	104, 400	69, 600
Total.....	876, 484	850, 384	815, 584
Single occupancy:			
Frozen food:			
Facilities.....	349, 598	349, 598	349, 598
Land (3.7 acres).....	55, 500	44, 400	29, 600
Total.....	405, 098	393, 998	379, 198
Coffee roaster:			
Facilities.....	277, 542	277, 542	277, 542
Land (3.9 acres).....	58, 500	46, 800	31, 200
Total.....	336, 042	324, 342	308, 742
Grocery:			
Facilities.....	961, 601	961, 601	961, 601
Land (9.5 acres).....	142, 500	114, 000	76, 000
Total.....	1, 104, 101	1, 075, 601	1, 037, 601
Public warehouse I:			
Facilities.....	1, 009, 755	1, 009, 755	1, 009, 755
Land (10.9 acres).....	163, 500	130, 800	87, 200
Total.....	1, 173, 255	1, 140, 555	1, 096, 955
Public warehouse II:			
Facilities.....	2, 146, 597	2, 146, 597	2, 146, 597
Land (15.3 acres).....	229, 500	183, 600	122, 400
Total.....	2, 376, 097	2, 330, 197	2, 268, 997
Public warehouse III:			
Facilities.....	1, 808, 962	1, 808, 962	1, 808, 962
Land (13.3 acres).....	199, 500	159, 600	106, 400
Total.....	2, 008, 462	1, 968, 562	1, 915, 362
Food chain:			
Facilities.....	6, 070, 628	6, 070, 628	6, 070, 628
Land (34.9 acres).....	523, 500	418, 800	279, 200
Total.....	6, 594, 128	6, 489, 428	6, 349, 828
Total investment:			
Facilities.....	13, 370, 667	13, 370, 667	13, 370, 667
Land (100 acres).....	1, 503, 000	1, 202, 400	801, 600
Total.....	14, 873, 667	14, 573, 067	14, 172, 267

¹ Land costs are based on estimates of market value determined by local realtors, contractors, and by various planners, and on sales in the area in 1966. Does not include land for future development.

² Includes cost of 1 unit as a restaurant.

FINANCING AND OPERATING A FOOD DISTRIBUTION CENTER

The finest in overall market design and construction will not insure the success of a new food distribution center unless it is properly promoted and soundly managed.

Producers, processors, transportation companies, wholesalers, retailers, and consumers are concerned with the operation of the market. Investors, whether private or public, have a right to expect a reasonable return on their investment and assurance that their interests will be protected. The center's governing body should be capable of looking after the interests of these groups.

Safeguards should be provided to prevent exploitation of the industry by the owners of the wholesale food distribution center because the market should function as a public facility. As the food center develops, the reason for precautions will become even more apparent.

No matter who may construct or finance the center, there should be definite assurances that—

1. It will be properly located, designed, and equipped.

2. Overbuilding will be prevented to assure maximum occupancy.

3. Funds will be invested wisely to provide for real needs, so that increased efficiency will not be offset by high rent or ownership costs.

4. Facilities will be used in the best interest of the industry and the public.

5. The center will be operated without discrimination against buyer, seller, mode of transportation, or origin of shipment.

Methods of Financing

Regardless of the organizational structure used, an entity should be formed to finance and develop a complete food distribution center, with an area for future development. Food centers can be financed and operated in several ways. Some of the more common methods are private corporations, public benefit corporations, direct public ownership, or various combinations of these methods.

Private Corporation

The private corporation is a legal entity organized in conformity with State statutes and made up of individuals bound together for a common purpose or objective. The owners of this legal entity have complete control over operations, subject only to generalized legal restrictions.

A private corporation may be operated as either a profit-making or a nonprofit organization. Generally, when a private corporation is operated for profit, no restrictions are placed on the sale of voting stock to any individual because of his occupation or profession, nor on the number of shares of voting stock that may be held by any one individual. Stockholders have one vote in cor-

porate affairs for each share of voting stock held. Several wholesale food markets are owned and operated by private corporations. In some, the principal stockholders are the tenants. In others, the corporation is a railroad company or some other company organized for another type of business.

To form a private corporation, the incorporators formulate the articles of incorporation in compliance with State statutes and obtain State approval. This charter defines the powers of the corporation and of its officers and directors, and states the corporation's purpose. It further specifies the stockholders' rights and the way in which control shall be exercised.

The following are some of the characteristics of private corporations:

1. The board of directors has power to make decisions quickly.

2. State statutes place few restrictions on membership or operations of a private corporation.

3. Private corporations are usually financed by selling bonds and by issuing stock.

4. The bylaws of a private corporation may be written so that the tenants who occupy the facilities while the investment is being amortized will be able to recoup some of the rent and service charges paid during this period.

Some wholesale food markets owned by private corporations have tended to become restrictive in how they can be used, such as prohibiting the delivery of food items brought in by trucks, especially out-of-State trucks. Often, private corporations do not provide space for expansion, either for increased volume of the occupants or for new food handlers and allied industries. The major problem of corporate ownership is that substantial financial equity is required. Private corporation market sponsors have sometimes found it more difficult to obtain funds to take care of preliminary organization and to acquire equity funds than public market sponsors.

A nonprofit private corporation is not an agency of government, but it must be organized in conformity with existing State statutes. As a rule, State statutes place no limitations on participation in the corporation because of business or occupation. However, membership can usually be restricted or limited through bylaws. In a nonprofit private corporation, participation in corporate rights and activities is usually based either on a system of dues, which limits each member (stockholder) to one vote, or on bylaws, which restrict ownership of voting stock to one share per member. It is possible for those who are directly interested in ownership and operation of a food distribution center to form a nonprofit private corporation to construct and operate the center. An

example of a nonprofit private corporation is the small business investment company set up under the Small Business Administration. The following is a brief description of this type of organization:

The Congress in 1958 enacted the Small Business Investment Act, establishing a program to stimulate the flow of private equity capital and to permit long-term loans for the sound financing of the operations, growth, expansion, and modernization of small business concerns. Under this act, the Small Business Administration is authorized to make loans to so-called State development companies, and to license, regulate, and give financial assistance to privately organized, privately financed companies called small business investment companies.

A development company is a profit or nonprofit enterprise incorporated under State law, with authority to promote and assist the growth and development of small businesses in specific areas. A State development company is a corporation organized under a special legislative act to operate Statewide. A local development company is a corporation organized with a broad base of ownership under any applicable State laws, to further the economic development of its communities.

The Small Business Administration is authorized to make loans to State and local development companies in exchange for obligations of the development company. It is also authorized to make loans for plant construction, conversion, or expansion, and for the acquisition of land. Such loans may be made either directly or in cooperation with banks or other lending institutions. Certain rules and regulations have been set up defining eligible business categories and needed collateral.

Public Benefit Corporation

Public benefit corporations, sometimes called "market authorities," offer some desirable features not found in other types of ownership. They differ from nonprofit private corporations in that they are publicly owned.

A public benefit corporation is a nonprofit agency. Rentals and other charges do not exceed the amount needed to pay the costs of operation, amortize the original investment, and maintain a limited contingency fund. Under public ownership the revenues would be considered as public funds. However, these funds might possibly be appropriated for other public uses while bonds remained outstanding, unless they are specifically committed to redemption of bonds.

Public benefit corporations usually have the power of eminent domain, which can be useful in the acquisition of a site. Such corporations usually finance market improvements through the sale of revenue bonds. This type of financing normally is not a full obligation of a State or a political subdivision. These revenue bonds are often tax

exempt; therefore, the interest cost may be lower. A public agency, such as a market authority, is more likely than some types of private ownership to provide for future expansion and to work toward the establishment of a complete food distribution center. A market authority may or may not be required to pay taxes to the community in which it is located; the community may authorize a payment in lieu of taxes.

Market authorities have certain limitations, especially with respect to the financing and management of facilities. They find it difficult to raise funds through revenue bonds unless considerable equity funds are provided in some way or the bonds are guaranteed by the city, county, or State. Some State or city governments have appropriated part of the funds needed for land acquisition and original construction. The continuity of management may depend on the continuance of a State or municipal government administration in office. As a whole, market authorities do not have as complete freedom of operation as is possible under private ownership.

Direct Public Ownership

Several wholesale food marketing facilities have been financed, constructed, and operated by States, counties, or municipalities. Several States and some municipalities have enabling legislation covering the improvement or establishment of produce markets.

Direct State ownership and operation usually can be differentiated from ownership and operation by a State market authority by the methods of financing used and the delegation of authority made by the State legislature. Although some States have appropriated funds and otherwise assisted market authorities with financial problems, they do not usually underwrite the total cost of a market constructed by an authority, nor have the States always assumed responsibility for the operation of these markets.

Under direct State ownership, a market facility is financed in whole or in part by an appropriation of State funds. If the financing is not entirely by this method, the State usually is obligated for the remainder unless this balance is obtained through grants or donations. Also, the State is responsible for maintenance and other expense involved in the operation of a State-owned market.

States may finance, construct, and operate food distribution facilities because legislative bodies feel that improved facilities will in themselves serve the public interest.

Municipal ownership of a food distribution center is comparable in many of its basic aspects to direct State ownership. Some municipalities are authorized in their charters to construct and operate food markets. Some city councils or commissions are authorized to make appropriations from

general funds in the city treasury for the construction of market facilities, on a basis comparable to that of a State legislative body. Three methods are usually open to municipalities for financing a market development program: (1) Issuance of municipal bonds; (2) issuance of revenue warrants; and (3) loans from public corporations. In most cities the issuance of bonds for such purposes must be approved by a majority of the qualified electorate voting in a referendum.

Facilities constructed with municipal or county funds would necessarily be owned by the county or municipality, and rent would have to be paid by the tenants indefinitely.

Combinations

Because of the complexity of building large food distribution centers, the centers are not always built wholly by either public or private agencies. Recent construction in the Northeast typifies the possibilities of various combinations.

In Philadelphia, the food distribution center was built partly by a nonprofit corporation and partly by private owners on land purchased and put into condition for construction by the city. The city subordinated its interest so that the land could be used as equity in borrowing money for building. After the multiple-occupancy buildings were erected, the development company leased the units to an operating stock company formed by the prospective tenants. At the end of 30 years all buildings will become the property of the city, except those built on the parcels sold by the developing company with city approval for construction of single-occupancy buildings.

A fresh fruit and vegetable distribution center has been constructed in New York City by the city, which made direct leases to tenants. The city manages and maintains the center, which was financed through general obligation bonds. Individual wholesalers supply their own refrigeration requirements.

The New England Produce Center, Inc., was constructed in the Boston metropolitan area. This market was developed by a private corporation consisting of fresh fruit and vegetable wholesalers. It is entirely owned and operated by the participating firms. To develop the market, stockholders provided equity funds on the basis of their participation. The major sources of financing were from local lending institutions and the Small Business Administration. In addition to these facilities, three private grocery corporations are operating or developing close to the market site.

In Baltimore, wholesalers have formed a private nonprofit corporation of firms interested in developing facilities in a food distribution center. This corporation encompasses several food commodity groups. Presumably, the common stock in the corporation will be owned by the occupants of

the proposed facilities. This corporation will be able to buy or lease land on its own or with a developer, and to construct multiple-occupancy or single-occupancy buildings on the land it purchases. State market authority legislation has been approved. This legislation provides an authority that can either develop, or cooperate with a corporation in developing the proposed food distribution center. Under this program the authority can hold the land and either sell or develop it to suit the prospective tenant of the market.

In Cincinnati, the nucleus firms could possibly form their own nonprofit corporation. This organization could act as the developer of the food center or could represent the interests of the group with a developer. A corporation representing a group could deal with a private developer from a better bargaining position than that held by many single interests. In any event, the choice of methods of development should remain with the firms participating in the food center. Because a complete market is to develop from the proposed nucleus, consideration should be given to purchasing a total acreage with some organization holding land for future development.

Since the nucleus firms would require some protection against exploitation, it might be well to form a planning committee to review architectural designs for intended buildings, landscaping, and conformity to the master plan. This committee could be made up of the management and representatives of the nucleus firms. The planning committee could also analyze the suitability of prospective tenants as compatible members of the food industry.

Estimated Annual Operating Costs and Revenue Requirements

The method selected to finance and operate the proposed food center will affect the total annual revenue required. Since the financing and operating method has not been selected, it is assumed for purposes of this report that the suggested facilities will be constructed on 100 acres by private financing. This assumption is not intended to suggest the most desirable method nor to exclude other methods, but is presented so that some estimate of probable operating expenses can be included in this report.

The annual operating expenses and revenue requirements for the proposed facilities under a private corporation will be considered under three categories: (1) Debt service on the investment in land and facilities; (2) taxes on real property and improvements; and (3) management and maintenance costs.

Debt Service

The food distribution center should be financed so that it will be a self-sustaining entity. The in-

vestment should be repaid from market revenue and a certain standard of payment should be adhered to. A major item of costs that must be paid is debt service. The proportion of the total investment that might be borrowed on a mortgage loan and the terms of the loan depend to some extent on the money market. The facilities recommended should not become obsolete in less than 20 to 30 years and should have a useful life extending over a longer period. These facilities are multipurpose by design and could be converted to such alternative uses as light manufacturing, general warehousing, or a truck terminal.

The money required for the project would probably be obtained from three sources: (1) First mortgage bonds; (2) second mortgage bonds or preferred stock; and (3) equity capital. Because of fluctuations in the money market, various amounts at various interest rates might be obtained from each of these sources. It is assumed that about 65 percent might be obtained from a first mortgage, about 20 to 25 percent from a second mortgage, or a corporate issuance of preferred stock, with the balance coming from equity capital.

Because the precise financial arrangement and administrative structure has not been determined, the terms of the loan cannot be developed. In order to make some estimate of debt service requirements, a rate of 6½ percent amortized over 25 years was assumed on the advice of the local Cincinnati financial community. If the first mortgage was obtained at 6 percent, the second mortgage at 7 percent, and the equity capital had a return of approximately 7 percent, the average annual interest rate would be about 6½ percent.

If stocks or bonds were issued, purchasers would probably demand that annual income exceed annual expenses by a stipulated amount and that a fund be created to guarantee payment. The exact amount required would vary with such factors as the security of the loan and the money market.

Financiers have indicated that the normal fund requirements would be about 1 year's total payment, or approximately \$1.2 million. This amount could be borrowed as a part of the initial issue. The money held in escrow could be invested in an approved bank, or savings and loan association, or in U.S. Treasury bonds, and the interest earned applied to the amortization of the loan. At an annual interest rate of 6½ percent with a 25-year amortization period, the annual cost of this reserve would be about \$98,400. This amount could be partially offset by the earnings of the escrow account, assumed to be about 4 percent annually, or \$48,000. Thus, the annual net cost of the escrow account would be \$50,400.

On the basis of the aforementioned assumptions, the annual revenue required for debt service (table 3) would range from \$1,212,239 to \$1,269,743, depending on the site selected.

TABLE 3.—*Estimated annual payments required for debt service for a nucleus of a food distribution center proposed for the Cincinnati area, by type of facility and by site*

Type of facility	Princeton Road	Windisch Road	Mount Carmel Road
Multiple-occupancy:			
Amortization ¹	\$71, 854	\$69, 718	\$66, 861
Amortization of escrow account ²	3, 024	3, 024	3, 024
Total debt service.....	74, 878	72, 742	69, 885
Single-occupancy:			
Frozen food:			
Amortization ¹	33, 210	32, 300	31, 087
Amortization of escrow account ²	1, 512	1, 512	1, 512
Total debt service.....	34, 722	33, 812	32, 599
Coffee roaster:			
Amortization ¹	27, 549	26, 590	25, 311
Amortization of escrow account ²	1, 008	1, 008	1, 008
Total debt service.....	28, 557	27, 598	26, 319
Grocery:			
Amortization ¹	90, 514	88, 178	85, 063
Amortization of escrow account ²	3, 528	3, 528	3, 528
Total debt service.....	94, 042	91, 706	88, 591
Public warehouse I:			
Amortization ¹	96, 183	93, 501	89, 928
Amortization of escrow account ²	4, 032	4, 032	4, 032
Total debt service.....	100, 215	97, 533	93, 960
Public warehouse II:			
Amortization ¹	194, 792	191, 029	186, 012
Amortization of escrow account ²	8, 064	8, 064	8, 064
Total debt service.....	202, 856	199, 093	194, 076
Public warehouse III:			
Amortization ¹	164, 654	161, 382	157, 020
Amortization of escrow account ²	6, 552	6, 552	6, 552
Total debt service.....	171, 206	167, 934	163, 572
Food chain:			
Amortization ¹	540, 587	532, 002	520, 557
Amortization of escrow account ²	22, 680	22, 680	22, 680
Total debt service.....	563, 267	554, 682	543, 237

See footnotes at end of table.

Table continued on p. 30.

TABLE 3.—*Estimated annual payments required for debt service for a nucleus of a food distribution center proposed for the Cincinnati area, by type of facility and by site—Continued*

Type of facility	Princeton Road	Windisch Road	Mount Carmel Road
Grand total:			
Amortization ¹	\$1,210,343	\$1,194,700	\$1,161,839
Amortization of escrow account ²	50, 400	50, 400	50, 400
Total debt service.....	1,269,743	1,245,100	1,212,239

¹ Based on 6½ percent over 25 years on the total investment cost (table 2), \$81.98 per \$1,000.

² At an annual interest rate of 6½ percent amortized over 25 years, the annual cost of the \$1.2 million escrow account would be approximately \$98,400. This would be partially offset by earnings of the invested escrow account, assumed to return about 4 percent annually, or about \$48,000. Thus the net escrow payment required would be \$50,400.

Real Estate Taxes

One of the major expenses incurred in the operation of a food distribution center by a private firm would be taxes on real property and improvements. The market value of the property is assumed to be the total investment costs in land and improvements.

Tax rates are applied to the assessed valuations of the sites at the time of the study. In Ohio, assessed valuation is not the same as market value. Assessors assess real property at a percentage of market value. The assessment rates used were as follows:

County	Percent
Hamilton	50
Clermont	43
Butler	42

The 1966 tax rates per \$1,000 of assessed valuation varied between each county and the townships within these counties. The following rates were used:

Site	Rate per \$1,000
Princeton Road (Butler County)	\$32.35
Windisch Road (Butler County)	32.35
Mt. Carmel Road (Clermont and Hamilton Counties)	37.88

At the Mt. Carmel Road site, there are two counties—Hamilton and Clermont. Since each county differs in its tax rate and basis for assessed valuations, these were based on the amount of land in each jurisdiction and a proportioned share of the facilities.

It is possible that taxes will increase in later years either through revised valuations or higher

rates, or a combination of both. For this reason, a contingency tax fund of 10 percent has been included in the total annual estimated real estate taxes (table 4).

TABLE 4.—*Annual real estate taxes estimated for a nucleus of a food distribution center proposed for the Cincinnati area, by type of facility and by site*

Type of facility	Princeton Road	Windisch Road	Mount Carmel Road ¹
Multiple-occupancy:			
Tax ²	\$11, 908	\$11, 554	\$15, 870
Contingency ³	1, 191	1, 155	1, 587
Total.....	13, 099	12, 709	17, 457
Single-occupancy:			
Frozen food:			
Tax ²	5, 504	5, 353	7, 326
Contingency ³	550	535	733
Total.....	6, 054	5, 888	8, 059
Coffee roaster:			
Tax ²	4, 566	4, 403	5, 965
Contingency ³	457	441	596
Total.....	5, 023	4, 844	6, 561
Grocery:			
Tax ²	15, 001	14, 614	20, 045
Contingency ³	1, 500	1, 461	2, 004
Total.....	16, 501	16, 075	22, 049
Public warehouse I:			
Tax ²	15, 941	15, 497	21, 192
Contingency ³	1, 594	1, 550	2, 119
Total.....	17, 535	17, 047	23, 311
Public warehouse II:			
Tax ²	32, 284	31, 660	43, 834
Contingency ³	3, 228	3, 166	4, 383
Total.....	35, 512	34, 826	48, 217
Public warehouse III:			
Tax ²	27, 289	26, 747	37, 003
Contingency ³	2, 729	2, 675	3, 700
Total.....	30, 018	29, 422	40, 703
Food-chain:			
Tax ²	89, 594	88, 172	122, 670
Contingency ³	8, 959	8, 817	12, 267
Total.....	98, 553	96, 989	134, 937
Grand total:			
Tax ²	202, 087	198, 000	273, 005
Contingency ³	20, 208	19, 800	27, 389
Total.....	222, 295	217, 800	301, 294

¹ Includes pro rata tax payment for parts in both Clermont and Hamilton Counties.

² Based on total investment in land and facilities (table 2).

³ 10 percent of tax payment.

Management and Maintenance

Since there are only 12 multiple-occupancy units provided in the nucleus of the center and the other facilities are single-occupancy buildings requiring little or no management, the cost for such services are limited. Certainly as the nucleus expands and the center expands, management services will be required. At this time, the cost of the management staff should be prorated among the tenants on an equitable basis.

The rates for liability and fire insurance can vary. Such factors as water pressure, housekeeping procedures, and number of fire extinguishers can affect these rates. The rates used are based on estimates made by local liability and fire insurance underwriters. They are based on the use of sprinkler systems, use of metal trash receptacles with metal lids, and on central station supervision of the center, or a watchman with an approved clock, or an approved thermostat system. Fire and extended coverage was estimated to be about \$0.11 per \$100 on 80 percent of the value, and liability insurance would be approximately \$0.944 per 100 square feet of building. These rates do not include insurance on contents of the buildings or offices. All rates for insurance would be determined at the time of investigation for actual coverage.

Street cleaning and general maintenance costs have been applied to all buildings and facilities provided in the food center. These costs are based on estimates for similar developments.

Estimated annual maintenance costs for the food center are as follows:

Maintenance:	
Watchmen	\$20,000
Insurance:	
Liability, fire, and extended coverage	23,885
Street cleaning and snow removal	20,000
General maintenance ¹	66,853
Contingency allowance ²	13,074
Total costs	143,812

¹ Based on 0.50 percent of the cost of buildings and other facilities.

² 10 percent of the total cost.

Total Annual Revenue Required

Table 5 shows the estimated total annual revenue required to operate and finance the proposed nucleus based on private development. Included in the estimate are costs for debt service, real estate taxes, and management and maintenance. The facilities costs and management and maintenance costs will remain the same, no matter which site is selected. Land costs and real estate taxes vary with each site, causing the total annual revenue required to vary. Operating expenses of individual firms are not included. The annual costs for each site are as follows: Princeton Road,

TABLE 5.—*Estimated total annual revenue required to operate and finance a nucleus for a food distribution center proposed for the Cincinnati area, by type of facility and by site*

Type of facility	Princeton Road	Windisch Road	Mount Carmel Road
Multiple-occupancy: ¹			
Debt service	\$74,878	\$72,742	\$69,885
Real estate taxes	13,099	12,709	17,457
Maintenance ²	8,629	8,629	8,629
Total	96,606	94,080	95,971
Single-occupancy:			
Frozen food:			
Debt service	34,722	33,812	32,599
Real estate taxes	6,054	5,888	8,059
Maintenance ²	4,314	4,314	4,314
Total	45,090	44,014	44,972
Coffee roaster:			
Debt service	28,557	27,598	26,319
Real estate taxes	5,023	4,844	6,561
Maintenance ²	2,876	2,876	2,876
Total	36,456	35,318	35,756
Grocery:			
Debt service	94,042	91,706	88,591
Real estate taxes	16,501	16,075	22,049
Maintenance ²	10,067	10,067	10,067
Total	120,610	117,848	120,707
Public warehouse I:			
Debt service	100,215	97,533	93,960
Real estate taxes	17,535	17,047	23,311
Maintenance ²	11,504	11,504	11,504
Total	129,254	126,084	128,775
Public warehouse II:			
Debt service	202,856	199,093	194,076
Real estate taxes	35,512	34,826	48,217
Maintenance ²	23,011	23,011	23,011
Total	261,379	256,930	265,304
Public warehouse III:			
Debt service	171,206	167,934	163,572
Real estate taxes	30,018	29,422	40,703
Maintenance ²	18,696	18,696	18,696
Total	219,920	216,052	222,971
Food-chain:			
Debt service	563,267	554,682	543,237
Real estate taxes	98,553	96,989	134,937
Maintenance ²	64,715	64,715	64,715
Total	726,535	716,386	742,889
Grand total:			
Debt service	1,269,743	1,245,100	1,212,239
Real estate taxes	222,295	217,800	301,294
Maintenance ²	143,812	143,812	143,812
Total	1,635,850	1,606,712	1,657,345

¹ Includes one unit as a restaurant, with a public restroom beneath.

² Based on 0.50 percent of the cost of buildings and other facilities.

\$1,635,850; Windisch Road, \$1,606,712; and Mt. Carmel Road, \$1,657,345.

Estimated Annual Ownership Costs

Although miscellaneous revenue-producing items such as public telephones, vending machines, and advertising signs would yield minor amounts, the major source of revenue for the proposed facilities will come from the charges for the buildings. These charges could vary considerably with the method used to own and operate the market. Since the charges are based on the assumption that

the food center is privately financed and operated, they are considered ownership costs. At the end of 25 years, the tenants would own their facilities and land.

The rental costs per square foot, as shown in table 6, are based on the first-floor building area. They do not take into consideration specialized facilities and equipment provided by individuals in the buildings.

No provision has been made for vacancies. When construction begins, long-term agreements should be signed by individual firms to prevent vacancies or overbuilding.

TABLE 6.—*Estimated annual rental costs required per square foot of building area for a nucleus of a food distribution center proposed for the Cincinnati area, by type of facility and by site*¹

Type of facility	Total first floor build- ing area (square feet)	Annual ownership costs per square foot ²		
		Princeton Road	Windisch Road	Mount Carmel Road
Multiple-occupancy:				
Stores-----	36, 000	\$2. 44	\$2. 38	\$2. 43
Restaurant-----	3, 000	2. 90	2. 82	2. 88
Total or average-----	39, 000	2. 48	2. 41	2. 46
Single-occupancy:				
Frozen food-----	10, 000	4. 51	4. 40	4. 50
Coffee roaster-----	15, 000	2. 43	2. 36	2. 38
Grocery-----	60, 000	2. 01	1. 96	2. 01
Public warehouse I-----	60, 000	2. 15	2. 10	2. 15
Public warehouse II-----	120, 000	2. 18	2. 14	2. 21
Public warehouse III-----	140, 000	1. 57	1. 54	1. 59
Food-chain-----	410, 000	1. 77	1. 75	1. 81
Total or average-----	854, 000	1. 92	1. 88	1. 94

¹ Based on total annual revenue requirements shown in table 5.

² Rounded to the nearest cent.

BENEFITS FROM IMPROVED FACILITIES

A detailed analysis of costs and savings cannot be given for the 12 firms included in this study without revealing confidential data provided by the firms. However, individual costs and savings can be combined and presented without violation of confidence, and the result will still have meaning when compared with like data. In table 7, the 1966 costs related to facilities for all 12 firms are compared with estimated costs in the proposed facilities. The estimated costs in the new facilities are based on U.S. Department of Agriculture research on operating costs within modern terminal facilities using proper kinds and amounts of handling equipment.

Table 7 indicates that there would be an additional expense of about \$719,000 as the result of

TABLE 7.—*Selected costs for 12 wholesale food firms before and after their relocation in food distribution center proposed for Cincinnati area*

Item	Present	Proposed	Savings
Cartage and delay----	\$26, 032	\$2, 603	\$23, 429
Handling-----	1,378,219	758, 020	620, 199
Warehouse charge----	9, 200	4, 550	4, 650
Warehouse damage----	15, 750	3, 937	11, 813
Rent-----	255, 886 ¹	1,635,000	-1,379,114
Total-----	1,685,087	2,404,110	-719, 023

¹ Midpoint of 3 possible site costs.

having new food marketing facilities. This increased expense is solely in the "rent" item, for there are savings in the other categories. Moreover, the "rent" item is largely the expense of buying the facilities, because ultimately they would be owned by the tenants. Furthermore, there are other

savings that cannot be readily measured, and some cannot be measured at all. These nonmeasurable costs and savings can be very significant to the total cost of marketing food, and they become evident and cumulative with the development and use of improved food marketing facilities.

CONCLUSIONS

Some firms will have to move from their present locations because of urban or highway development programs. Others will eventually have to move because their costs of operations are too high. If firms work together as a group, they can obtain new facilities at one location for less money than if they acted independently and located at scattered locations. They can get better financing arrangements and lower insurance rates. Services such as security, street cleaning, and snow removal can be obtained for less cost per firm. Product transfers among dealers can be faster, and a concentration of larger quantities of products will attract buyers. Distribution can be more efficient if facilities are near a major expressway system. Within a central market, nonmarket traffic can be eliminated, and wide streets and adequate parking space will greatly reduce market traffic congestion and hindrances to trucks. Costs of maintenance and repairs should be at a minimum in new facilities, and banks, service stations, brokers' of-

fices, and other similar services can be expected to locate nearby as there would be a large concentration of people to serve.

In addition, producers can expect less damage to their products as the products would receive less handling in a modern food center. Transportation companies can provide better service at a consolidated food distribution center with market traffic congestion eliminated. Local communities will benefit by having the land now used by some food firms used more economically. Redevelopment and highway construction programs can proceed without delay. Fire, health, and sanitary codes can be better controlled and enforced.

Consumers may expect to benefit from improved food marketing facilities as much as any other group. They can expect to receive food in better condition, and with a central food distribution center, they can expect food firms to be in a better position to hold food prices down.

APPENDIX

Guides to Planning Interior Operational Layouts

A number of general principles should be considered when planning interior layouts. It is important that an efficient interior operational layout be planned before construction to determine the locations of (1) insulation for refrigerated areas; (2) electrical outlets and utilities control panels; (3) lighting fixtures (over aisles for more accurate selection); (4) equipment servicing areas; (5) pallet racks; (6) drains; (7) thermostats; (8) columns; and (9) removable walls or partitions in the direction of future expansion.

Plans for a layout should be based on the following principles:

1. Maximum space use—Making full use of the storage cube by using pallet racks to hold the pallets of merchandise in tiers.

2. Rapid flow of products—Storage areas, platforms, doors, and aisles should be planned to provide both access to the storage areas in the least amount of time and maximum use of space. Items with the most rapid turnover should travel the shortest distances.

3. Flexibility of space use—In an industry of rapid technological advancements such as the food

industry, flexibility is highly desirable. Large open areas with a minimum of obstructions will help provide this flexibility. In the storage areas, four-way entry pallets and adjustable pallet racks offer further flexibility.

4. Protection of product quality—Maintaining the quality of food is essential. Handling systems that minimize the number of times products are handled and the distance they are transported reduce the possibility of physical damage during handling. Refrigeration facilities that maintain the proper temperature and humidity for specific perishable foods help prolong product quality.

5. Future expansion—Facilities must be planned so they can be expanded, or otherwise they may soon become obsolete. Expansion needs are estimated, but they are based on expected growth rates of various businesses or individual firms. Planning for the expansion of refrigerated areas is of primary concern because of insulation requirements.

6. Supervision and control—The amount of supervising required, including the labor force to be directed and the area to be serviced, should be considered in designing the interior arrangement. The supervisor must keep waste, deterioration, and

pilferage at a minimum and exert maximum control over the labor force.

7. Safety and comfort of employees—Adequate lighting, temperature control, and welfare facilities should be planned for the comfort of employees. A complete safety program including such features as protective guards on material-handling equipment, traffic signs strategically located, planned passageways for foot traffic, and fire preventive measures should be incorporated into the layout.

Recommended Handling Systems

To achieve maximum economy from new facilities, efficient internal handling operations are necessary. A palletized handling system would, in most cases, meet the requirements for moving and storing packaged products. To make full use of the storage space, adjustable pallet racks three-tiers high are recommended. Each vertical rack support should have a 4- by 5-inch metal base plate to act as a weight distributor. For greater density of storage, drive-in and drive-through pallet racks are suggested instead of conventional pallet racks. Adjustable, clamp-type racks are recommended because they are easy to assemble and disassemble and offer flexible shelf height. The bottom tier of pallets should be used for product display and selection, and the upper tiers for replacement and storage. It is advisable to formulate a stacking pattern for each item to be palletized. Interlocking patterns that allow air circulation through the load for nonfrozen refrigerated items are necessary. Stacking heights on pallets will vary with the commodity and the size of package, and will generally be determined by the stability of the load and the ability of the bottom layer to withstand the load above it.

For quantities too small to palletize, adjustable storage shelves are suggested.

To transport pallet loads, forklift trucks should be used by the larger dealers. The trucks should be equipped with overhead guards and load backrests, and should be powered by batteries. The load capacity of the forklift truck should be determined by the largest weight it will be required to transport. Narrow-aisle, straddle-forklift trucks would be satisfactory for relatively short transport distances, but the heavier duty counterbalance-forklift trucks would be more satisfactory for longer transporting distances. Patience and skill should be exerted in training forklift operators. Good training is certain to pay dividends in shorter operating hours and in correct care of products and equipment.

Planning should include space and equipment sufficient to absorb a projected increase in the firm's volume. This kind of planning will provide long range economic advantage in a competitive industry such as the food industry.

Four-wheel handtrucks are recommended for small-volume dealers for assembling orders and serving the "cash and carry" customer. For larger volume dealers, who select orders in larger lots, mechanized equipment should be used rather than four-wheel handcarts.

These are general recommendations that will vary from dealer to dealer, depending on each dealer's volume of business and type of operation. Firms handling very small volumes would not need to use power equipment for handling operations; instead, they could use semilive skids and pallet jacks. Other small-volume dealers could form equipment ownership pools or rent equipment so as to hold down the initial investment costs. Extremely large-volume dealers might employ more sophisticated mechanized operations, such as automatic tow-tractor systems with four-wheel handtrucks programed to certain areas for order selection and loading.

Refrigeration

All refrigeration installation details should be completed before the start of building construction. Individual refrigeration requirements vary and the choice of refrigeration should be left to the individual firms, unless the central refrigeration system approach is chosen. Consideration should be given to installing a central refrigerating system. This system will result in lower capital-equipment investment and more significant savings in owning and operating costs than unitary systems for individual firms. With central systems, care must be exercised so that service regulations protect both the supplier and the user of refrigeration.

Should individual firms have their own complete refrigeration systems, the condensing units could be placed in a machinery area. The central-system approach requires a separate, centrally located equipment room to house the compressors, condensers, and auxiliary components.

Where refrigerated rooms are large, the palletized handling system is recommended. Coolers could be subdivided for specific commodities to alleviate possible odor problems. Certain coolers might be further designed so they could be converted to a freezer. Cool air circulation in refrigerated areas is a further consideration. According to the type of product stored, a sufficient area should be clear above the uppermost storage tier to allow for the proper air distribution. About 6 inches of clear space is required between pallets and wall for cool air circulation. Humidity control to maintain quality and reduce shrinkage is also needed, particularly when meat and meat products are handled. When freezers are contemplated, floors should be constructed so as to prevent them from buckling from frost.